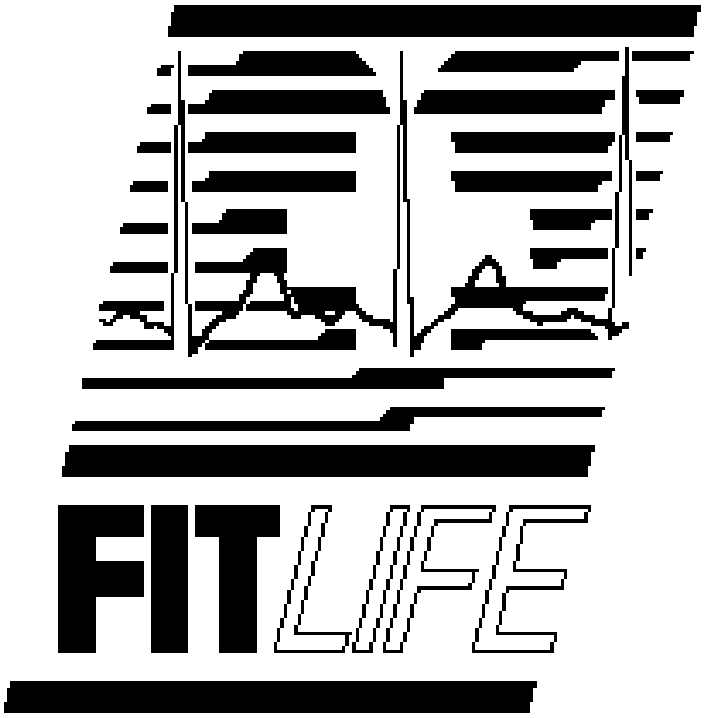
Applied Exercise Science Laboratory
&
FIT*LIFE* Exercise Program Manual



Applied Exercise Science Laboratory
Department of Health & Kinesiology
TEXAS A&M UNIVERSITY

Compiled by

Steven E. Martin, Ph.D.
Clinical Assistant Professor
Coordinator, FIT*LIFE* Exercise Program

John S. Green, Ed.D., **Ph.D., F.A.C.S.M.**
Clinical Professor
Coordinator, Clinical / Applied Exercise Physiology

Stephen F. Crouse, Ph.D., F.A.C.S.M.
Director, Applied Exercise Science Laboratory
Director, FIT*LIFE* Exercise Program
Coordinator, Sport Physiology

TABLE OF CONTENTS

Part 1 - Exercise Program Policies and Procedures

Part 2 - Exercise Testing Procedures

PURPOSE OF MANUAL

The purpose of this manuscript is to provide written documentation of the policies and procedures adhered to by the faculty, staff, and students of the Applied Exercise Science Laboratory and FIT*LIFE* Exercise Program at Texas A&M University. The laboratory procedures, safety regulations, and emergency paradigms were compiled by the faculty and staff of the Applied Exercise Science Laboratory and FIT*LIFE* Exercise Program. Medical procedures and exercise and fitness assessments have been approved by Curtis Stauffer, M.D., a cardiologist serving as the medical director of the FIT*LIFE* Exercise Program. These procedures are taught to students, both graduate and undergraduate, who use FIT*LIFE* and laboratory equipment and facilities. Finally, these procedures are reviewed and updated on an annual basis or as needed to include new policies or regulations issued by governing organizations. All key safety points are in **bolded** text.

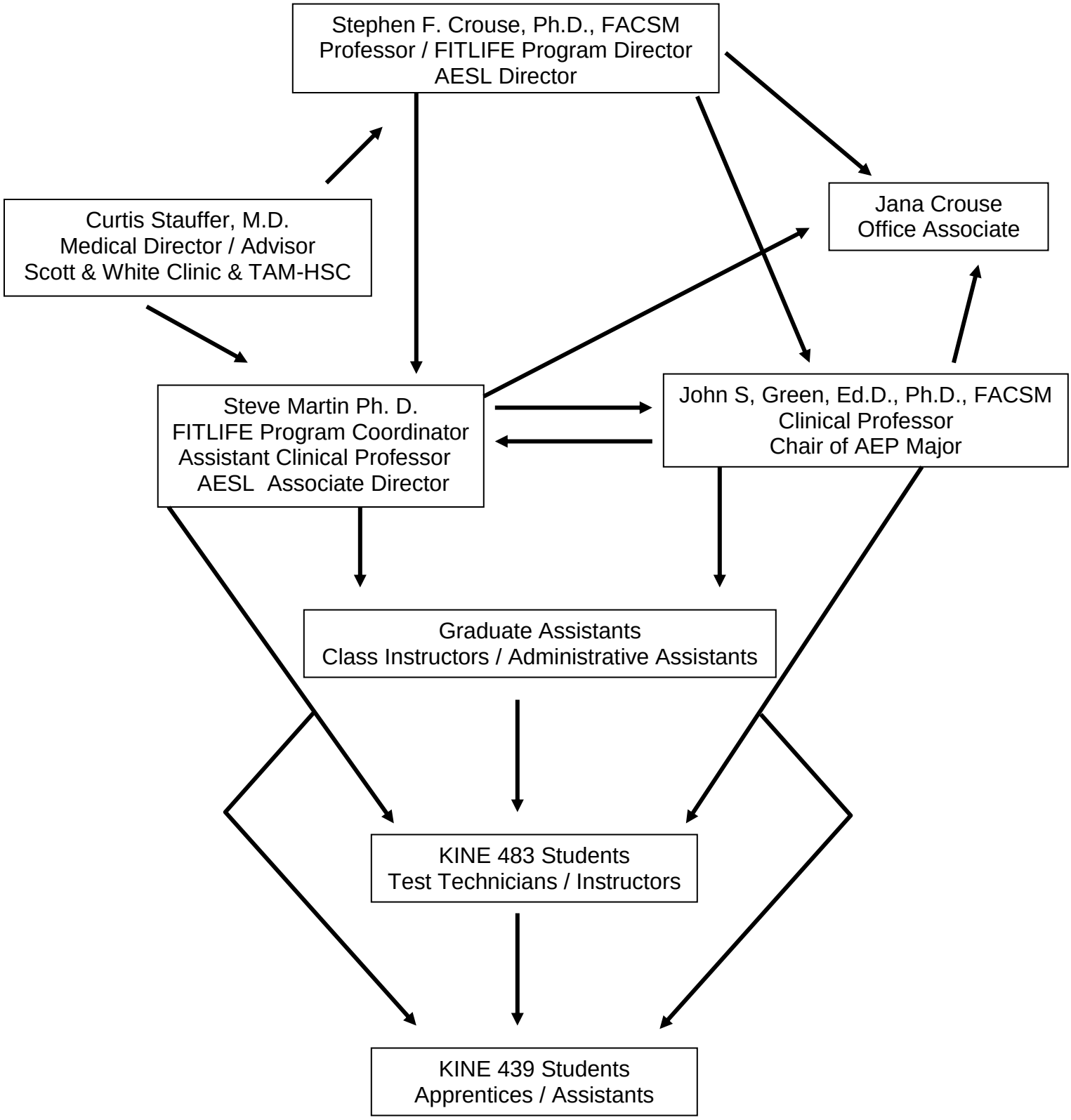
GENERAL PHILOSOPHY AND OBJECTIVES

The FIT*LIFE* Exercise Program, established in 1985 by the Texas A&M University Applied Exercise Science Laboratory in the Department of Health and Kinesiology, is designed to provide on-going exercise and health-enhancement education to the faculty, staff and students of Texas A&M University and the Bryan/College Station community at large. Founded on the belief that man is the sum of his spiritual, mental, and physical components, the program has a two-fold purpose:

1. Plan, research and promote health enhancement and exercise programs.
2. Provide undergraduate and graduate students experience in applied exercise physiology, including clinical and sport physiology, and cardiac rehabilitation / adult fitness programming.

The FIT*LIFE* Exercise Program is based in the Applied Exercise Science Laboratory and serves the university and community by providing fitness classes and complete health assessment testing with consultation to participants interested in cardiovascular fitness and overall health improvement. Complete health assessments include graded exercise testing, exercise prescription, various laboratory assessments of cardiovascular disease risk, assessment of pulmonary function, assessment of body composition, muscular strength and muscular endurance assessments, indices of athletic performance, nutritional guidance, and weight control.

Administrative Structure of the FIT*LIFE* Exercise Program



FIT*LIFE* EXERCISE PROGRAM POLICIES AND PROCEDURES

FITLIFE EXERCISE PROGRAM DESCRIPTION

The FIT*LIFE* Exercise Program, established in 1985 by the Texas A&M University Human Performance Laboratories and the Department of Health and Kinesiology, is designed to provide on-going exercise and health-enhancement education to the faculty, staff and students of Texas A&M University and the Bryan/College Station community at large. The FITLIFE Exercise Program is based in the Applied Exercise Science Laboratory and serves the university and community by providing exercise classes, fitness assessments, and incentive programs.

The FIT*LIFE* Exercise Program derives its effectiveness by incorporating a structured administrative and educational plan which ranges from the directors in the Department of Health and Kinesiology down to the apprentices involved in the fitness evaluation and education of program participants. This structure allows for full optimization of the facilities, personnel, and equipment while maximizing teaching and communication skills necessary to provide adequate health services to the clientele.

The administrative structure consists of:

Head of the Department of Health and Kinesiology (Dr. Richard Kreider)
Responsible for primary administration and policy

Chair of Kinesiology (Dr. David Wright)
Responsible for second level administration and policy

FIT*LIFE* Program Director (Dr. Stephen Crouse)
Maintains direct responsibility for the FIT*LIFE* exercise programs and the coordination of health assessment testing within the Applied Exercise Science Laboratory.

Chair of graduate and undergraduate Clinical & Applied Exercise Physiology – Internship coordinator and supervisor (Dr. John S. Green)

Academic Instruction Team
(Dr. John S. Green, Dr. Sue Bloomfield, Dr. Steven Martin, Dr. Steve Riechman)
Instruct classes associated with the FIT*LIFE* program
(KINE 439, KINE 483)

FIT*LIFE* Program Coordinator (Dr. Steven Martin)
Primary responsibility is direct coordination and implementation of FIT*LIFE* exercise classes, exercise testing, and the direct education, management and coordination of FIT*LIFE* instructors and apprentices.

FIT*LIFE* Exercise Class Supervisor (Dr. Steven Martin)
Manages and directly supervises FIT*LIFE* exercise classes. Responsibilities include: coordination of annual fun run with the AEP organization, on-site

evaluation of instructors and apprentices, provide in-service training workshops for instructors and apprentices, and assist the FIT*LIFE* coordinator in marketing and other duties.

FIT*LIFE* Program Instructor (KINE 483 students)
Primary responsibilities include: direct contact with the FIT*LIFE* Program Coordinator and class participants, the daily teaching and management of an exercise class, and educating apprentices to teach and manage a FIT*LIFE* exercise class.

FIT*LIFE* Program Apprentice (KINE 439 students)
Responsibilities include: learn proper procedures to teach and manage a FIT*LIFE* exercise class, acquire appropriate testing and exercise skills to meet the needs of clientele in all phases of the FIT*LIFE* Exercise Program.

FITLIFE CLIENT ENROLLMENT AND SCREENING PROCEDURES

To ensure the health and safety of individuals in the FIT*LIFE* Exercise Program, each participant must go through a preliminary screening procedure at the time of registration before they are allowed to begin exercise. In screening participants, the FIT*LIFE* program follows the guidelines set forth by the American College of Sports Medicine.

Enrollment:

Registration and enrollment for FIT*LIFE* exercise classes are held in the Applied Exercise Science Laboratory (AESL). Registration may be completed by mail, phone, fax, or on-site in the AESL. All registrants must complete the proper paper work and screening process before beginning exercise. FIT*LIFE* instructors **do not** register participants or accept cash or check payments from participants. Each FIT*LIFE* participant must present a valid membership card to participate in the exercise classes.

Client Screening

Each participant must complete a P.A.R.Q. (fitness questionnaire) immediately prior to any participation in the exercise class. If there are one or more question(s) answered with yes, and/or the participant is over 40 years old for men and 50 years old for women, a physician referral must be obtained by the participant prior to actively attending class **(unless otherwise approved by the FIT*LIFE* Coordinator and/or Director).** The referral must be placed on file in the Applied Exercise Science Laboratory.

FIT*LIFE* TELEPHONE REGISTRATION PROCEDURES

To the Registration Technician: Be prepared to answer information regarding exercise classes offered and listed prices. *See* both class descriptions and price lists in the registration notebook. Also, be familiar with the different media that were used to market our program.

1. Complete registration form over the phone. Do NOT skip any information listed on the form. Ask all questions.

2. Complete PARQ over the phone. Again, do NOT skip any information listed on the form.

3. Review the PARQ.
    - X. If the client answered no to all questions skip to #9.
    - X. If the client answered yes to one or more questions go to #4.

4. Inform the client that a physician's referral will be needed. If you recommend a physician=s referral check "PR Recommended by staff" on the registration form and the box "PR requested" on the membership card.

5. Ask the client if he/she has a physician's referral on file. If so, check to make sure it is current (no more than 2-3 years old) and ask the client if he/she has had any medical/health conditions change since they submitted the physician's referral. If appropriate, check the corresponding blank on the registration form and check the box "PR rec'd/on file" on the registration form and membership card.

6. If a physician's referral is requested by FIT*LIFE* AND there is not a physician's referral on file OR it is outdated, tell the client FIT*LIFE* will mail/fax a physician's referral form to him/her. Ask the client to have the form completely filled out by his or her personal physician and return it to the Applied Exercise Science Laboratory or his/her FIT*LIFE* instructor before they can begin exercise. In some cases, a client may be allowed to begin classes and return the physician's referral within the first week of classes. **These cases must be approved by the FIT*LIFE* Coordinator or FIT*LIFE* Director.**

7. If the phone personnel recommended a physician's referral, approval of the requested referral will be confirmed by the FIT*LIFE* Coordinator. Proper notation will be noted on the registration form.

8. When the physician's referral is received, have the FIT*LIFE* Coordinator review and approve the P.R. Check the box "PR rec'd/on file" on the registration form and membership card.

9. Record credit card name, #, and expiration date, and costs of class. Be sure method of payment is noted on registration form. Coupons are NOT valid for phone registration.

10. Tell the client that his/her membership packet will be sent to the address listed on the registration form. Ask the client to fill out the informed consent when the packet is received and return it to the Applied Exercise Science Lab or their instructor. (*membership card will note unsigned informed consent) **NOTE:** No membership cards will be sent to clients that do not have a physician's referral on file with the FIT*LIFE* office.

11. Enter all clients' data into the FIT*LIFE* registration spreadsheet. As we receive informed consents and physician referrals remember to enter the information into the registration spreadsheet. ***It is the responsibility of the FITLIFE registration office to keep accurate records and ensure that all clients requiring a physician's referral have one on file.***

12. Keep all registration forms for the day in the designated file in the FIT*LIFE* office for the FIT*LIFE* coordinator to review.

13. After coordinator has reviewed registration forms, file registration forms.

FIT*LIFE* <u>WALK-IN</u> REGISTRATION PROCEDURES

Be prepared to answer information regarding exercise classes offered and listed prices. *See* both class descriptions and price lists in the registration notebook. Also, be familiar with the different media that were used to market our program.

1. Have client <u>complete</u> **registration form, PARQ**, and **informed consent**. Make sure the registration form and PARQ have been completed thoroughly and correctly.

2. Review the PARQ.
   - X. If the client answered no to all questions skip to #8.
   - X. If the client answered yes to one or more questions go to #3.

3. Inform the client that a physician's referral will be needed. If you recommend a physician's referral check "PR Recommended by staff" on the registration form and the box "PR requested" on the membership card.

4. Ask the client if he/she has a physician's referral on file. If so, checks to make sure it is current (no more than 2-3 years old) and ask the client if he/she has had any medical/health conditions change since they submitted the physician's referral. If appropriate, check the corresponding blank on the registration form and check the box "PR rec'd/on file" on the registration form and membership card.

5. If a physician's referral is requested by FIT*LIFE* AND there is not a physician's referral on file OR it is outdated, give the client a physician's referral form to him/her. Ask the client to have the form completely filled out by his or her's personal physician and return it to the Applied Exercise Science Laboratory or his/her FIT*LIFE* instructor before they can begin exercise. In some cases, a client may be allowed to begin classes and return the physician's referral within the first week of classes. **These cases must be approved by the FIT*LIFE* Coordinator or FIT*LIFE* Director.**

6. If the registration personnel recommended a physician's referral, approval of the requested referral will be confirmed by the FIT*LIFE* Coordinator. Proper notation will be noted on the registration form.

7. When the physician's referral is received, have the FIT*LIFE* Coordinator review and approve the P.R. Check the box "PR rec'd/on file" on the registration form and membership card.

8. Direct client to the business office in 158 Read to remit payment. Walk-in's may

pay by check or credit card. Encourage payment by check. Be sure method of payment is noted on registration form. If paying by credit card, record credit card name, #, expiration date, 3 digit code, and costs of class. If paying by check, checks are payable to FIT*LIFE*. Staple valid coupons to registration form.

9. Give client his/her membership packet. Be sure to fill out the membership card. **Note:** No membership cards will be sent to clients that do not have a physician's referral on file with the FIT*LIFE* office.

10. Enter all clients' data into the FIT*LIFE* registration spreadsheet. As we receive informed consents and physician referrals remember to enter the information into the registration spreadsheet. ***It is the responsibility of the FITLIFE registration office to keep accurate records and ensure that all clients requiring a physician's referral have one on file.***

11. Keep all registration forms for the day in the designated file in the FIT*LIFE* office for the FIT*LIFE* coordinator to review.

12. After coordinator has reviewed registration forms, file registration forms.

FIT*LIFE* MAIL-IN REGISTRATION PROCEDURES

Mail FIT*LIFE* brochure to individuals requesting information about the program.

1. Completed forms plus payment will be mailed to the Applied Exercise Science Laboratory. Make sure forms are complete and method of payment is noted on registration form.

2. Review PARQ.
   - X. If the client answered no to all questions skip to #6.
   - X. If the client answered yes to one or more questions go to #3.

3. If the client checked that he/she has a physician's referral on file, locate it and verify that it is up to date. Note on the registration form that the physician's referral has been verified by checking "PR received & approved" on the registration form and "PR rec'd/on" file on the membership card.

4. If no physician's referral is on file, contact the client and notify them that a physician's referral will be needed to exercise in the program. If you recommend a physician's referral write your initials in the blank next to APR. Recommended by staff" on the registration form. Have the FIT*LIFE* Coordinator approve your recommendation. If they do not have a physician's referral mail/fax them a copy and ask the client to have the form completely filled out by his or her=s personal

physician and return it to the Applied Exercise Science Laboratory or his/her FIT*LIFE* instructor before they can begin exercise. In some cases, a client may be allowed to begin classes and return the physician's referral within the first week of classes. **These cases must be approved by the FIT*LIFE* Coordinator or FIT*LIFE* Director.**

5. When the physician's referral is received, have FIT*LIFE* Coordinator review it, then initial and date blank next to P.R. received and approved on clients registration form and enter information into registration spreadsheet.

6. Collect payment and turn it in to our business office in 158 Read Building. Make sure class costs and payment agree.

7. If time permits, mail client his/her membership packet. Be sure to fill out the membership card. (*membership card will note needed informed consent) Note: No membership cards will be sent to clients that do not have a physician's referral on file with the FIT*LIFE* office.

8. Enter all clients' data into the FIT*LIFE* registration spreadsheet. As we receive informed consents and physician referrals remember to enter the information into the registration spreadsheet. ***It is the responsibility of the FITLIFE registration office to keep accurate records and ensure that all clients requiring a physician's referral have one on file.***

9. Keep all registration forms for the day in the designated file in the FIT*LIFE* office for the FIT*LIFE* coordinator to review.

10. After coordinator has reviewed registration forms, file registration forms.

INSTRUCTOR & APPRENTICE GUIDELINES, RESPONSIBILITIES, AND EVALUATION

Instructors are generally enrolled in KINE 483. Apprenticeships must be completed prior to enrolling in KINE 483, and are usually completed during the semester in which the student is enrolled in KINE 439. **Students unable to complete all of the scheduled practicum experiences (teaching, testing, etc.) associated with the KINE 483 class will not be allowed to enroll. Although every attempt is made to accommodate the 483 student regarding exercise testing schedules and the assignment of exercise classes, the student must be able to participate in all phases of these assignments in order to complete the 483 semester.** In order to enhance the efficiency and credibility of the FIT*LIFE* program as well as the teaching experience of student instructors and apprentices, the following guidelines **must** be adhered to:

1. All instructors must be currently certified in CPR by AHA or Red Cross to the level of Basic Life Support (1 and 2 person CPR, obstructed airway, infant CPR, and AED). It is the responsibility of the instructor to obtain this certification prior to their

enrollment in the KINE 483 semester.

2. Professionalism is required.
   a. All instructors and apprentices are to be appropriately dressed and are expected to be present at their respective exercise classes a minimum of 10 minutes prior to the time the class meets. The instructor should also have the appropriate equipment needed to complete the workout session set up so class may be started **on time**. Instructors are also responsible for securing and locking the facility once the class is completed.

   b. Any planned instructor absences must be brought to the attention of the FIT*LIFE* exercise class supervisor one week prior to the scheduled absence. Instructors are responsible for securing their own substitutes from the current KINE 483 class roster.

   c. The assigned exercise class is the **total responsibility** of the assigned instructor. Scheduling and checking out of equipment, apprentice performance, and the assurance of a quality exercise session will be expected from each instructor. ***No Exceptions!***

   d. On scheduled exercise testing days, the 483 student must arrive at the lab at **7:45 am *sharp*** for a pre-testing briefing. Students and observers must be dressed appropriately (Men: slacks, FIT*LIFE* Polo shirt, - Women: slacks, dress, FIT*LIFE* Polo Shirt, or business suit - no warm-ups or jeans).

3. All lab equipment used for fitness evaluations (skin fold calipers, blood pressure cuffs, stethoscopes, and metronomes) are to be checked out on a daily basis through the FIT*LIFE* office as needed. Stereos for aerobic dance classes will be checked out on a semester basis when possible. The instructor listed on the check-out sheet is totally responsible for the condition of the equipment when it is returned.

4. Instructors (KINE 483 students) and apprentices (KINE 439 students) will be evaluated and assigned grades according to the guidelines set forth on the respective course syllabi. Remember, the job market in exercise science is very competitive. Your professors, FIT*LIFE* clients, and fellow students may all impact your future employment prospects. Don't just do the required minimum; that doesn't get you noticed. Go the extra mile....it will pay off in the long run.

FIT*LIFE* INSTRUCTOR RESPONSIBILITIES FOR CLIENT ENTRY INTO FIT*LIFE* EXERCISE CLASSES

As FIT*LIFE* instructors it is your responsibility to ensure that each client has the necessary information on file with the FIT*LIFE* office before you allow them to exercise in

your class. The following information outlines the procedures to follow to allow clients admission to your exercise class:

1. All members will receive a membership packet with the following information:
   Welcome letter from FIT*LIFE* Coordinator
   Informed Consent
   Physician's Referral (ONLY IF NEEDED)
   Incentive Program Information
   Parking Information
   Locker Room and Building Pass Procedures
   Membership Card (must have color corresponding with membership type)

2. Membership cards will note whether the client has turned in his/her informed consent and/or physician referral (if needed). This will be noted by having the corresponding box checked on the membership card.

3. <u>It is your responsibility</u> as the class instructor to check clients' membership card for:
   1) correct color of card for your class
   2) if the client needs to turn in an informed consent or physician's referral.

4. No client should have received a membership card without submitting their physician's referral, if needed. (Exceptions are approved by FIT*LIFE* Coordinator or Director ONLY) If the client does not have the "IC on file" box checked, politely ask the client if they have the form with them. If they do not have the informed consent, have them sign a form that you supply before they exercise. Extra informed consents will be supplied in your packet.

5. The client can turn in the informed consent to their FIT*LIFE* class instructor or the FIT*LIFE* secretary. If a client turns in this form to you (class instructor) BE SURE to note on their card that the form was received by checking "IC on file" and your initials LEGIBLY next to the correct box. Next, BE SURE to turn in the forms to the FIT*LIFE* secretary immediately. If a client says that he/she turned in the requested form to the lab secretary or mailed in the form and the card is NOT appropriately noted, check with the secretary to make sure it is on file BEFORE you sign the membership card.

6. Because FITLIFE members are allowed to attend any class within their membership, **Be sure** to check membership cards every class period AND have the clients sign-in each class period.

7. **IMPORTANT:** Since registration, physician referrals and informed consents are handled by the FITLIFE secretary, it is imperative that the instructor handle the responsibilities of keeping all records of their assigned exercise class and communicate with the secretary concerning all changes and status of class participants and class activity. Likewise, the instructor may request updated rosters at any time there are changes in the status of your class

INSTRUCTING A FITLIFE EXERCISE CLASS

BEFORE THE FIRST DAY OF CLASS

1. Make sure you understand the policies and procedures concerning client enrollment, client safety and liability concerns, and emergency procedures outlined in this manual. Also, you need to understand what information the client will be given when they enroll and your role in admitting clients into your class. You will also take responsibility in making sure FIT*LIFE* has all necessary information from each client.

2. You will receive the FIT*LIFE* program roster sheets during KINE 483 class period the week before exercise classes. You will receive your class assignment and check out all pertinent materials (stereo, keys, etc.) from the exercise class supervisor during the first week of academic classes. **Note:** You may review your client's fitness questionnaires. Be sure to make notes of any special conditions or circumstances that exist (i.e., drugs the client may be taking, special needs the client may have, etc.) This information will be necessary when designing individual exercise prescriptions.

3. Review your client roster and be familiar with which clients need a physician's referral or an informed consent. This will also be noted on the membership card.

4. Familiarize yourself with the locker and parking information for your particular class. Although members will receive this information in their membership packets, you still need to be able to answer any questions regarding this matter.

5. Make all necessary preparations for the first day of class. (i.e., music, choreography, class outline). Know and follow the description of your class.

6. Be sure you are familiar with your classroom, the location of the equipment you will need for class, and the operation of the stereo BEFORE the first day of class.

ON THE FIRST DAY OF CLASS

1. Introduce yourself and your apprentice(s) and welcome the clients to the class. Briefly give the clients an overview of your particular class and what they can expect throughout the semester.

2. It is your responsibility as the class instructor to check clients' membership card for:
   1) correct color of card for your class
   2) if the client needs to turn in an informed consent or physician's referral.
   Follow the procedures outlined under "Instructor Responsibilities for Client Entry Into The FIT*LIFE* Program.

3. Make sure everyone present in your class has the correct FIT*LIFE* membership card. Have each client sign-in on the attendance sheet (Make sure they **PRINT** their name legibly!).

4. Ask if everyone received their membership packet which contains information concerning parking, building entry, and locker rooms. Make a list of any clients who did not receive this information. (Turn this list into the FIT*LIFE* secretary).

5. Review the incentive program. Ask if anyone has any questions over this information.

6. Begin class.

7. Be sure to check membership cards each class period. FIT*LIFE* members are allowed to attend any class within their membership type.

GUIDELINES TO TEACHING AN EXERCISE CLASS

The ultimate goal is to provide class participants with the highest quality fitness education program, while providing student instructors with a quality learning experience. The following suggestions should be reviewed by all instructors and apprentices prior to the start of an exercise program:

1. **Think fitness** at all times while in the presence of clients. Other concerns or problems should be handled after class. **Start and end classes on time!!**

2. Introduce yourself to the entire class during the first week and ask participants to introduce themselves to each other. This lends a friendly atmosphere to the exercise environment.

3. Learn and use each client's name for easier communication and more personalized service.

4. Get to know your client's behavior, concerns and activities in order to streamline your exercise sessions to fit his/her needs while under your educated care.

5. Be aware of the fitness and skill level of your class and conduct your class to meet the needs of the majority of the class.

6. Be aware of your students. Always watch for signs of frustration, incorrect posture/body alignment and especially fatigue and illness. Don't hesitate to give your students personal attention and extra instruction.

7. Smile and be alive! Be courteous and greet your clients upon entering the room. This helps to monitor their attitude and lets them know you care.

8. Heart rates and blood pressures are best taken **prior** to any type of warm-up or exercise. If you have a client who wishes to have this done, ask them to arrive early so you may take the measurement before class begins.

9. Maintain good eye contact with your clients at all times. This allows you to check on their progress during exercise. You can also acknowledge him/her for a good job through good eye contact.

10. Make sure that your speech is clearly heard from anywhere in the room, especially while music is being played.

11. Pre-class instruction is extremely helpful for the clients. This enables the client to obtain a clear understanding of the activities to be performed.

12. While the instructor leads the exercise class, apprentices should be aware of clients that may require assistance in the proper performance of an exercise. The apprentice should immediately provide necessary guidance to the client. This will result in the client receiving greater benefit from the exercise program.

13. Converse with your clients while exercising in order to maintain effort and efficiency of participation.

14. Vary your music and exercise routines/format regularly to enhance motivation**.**

15. Avoid DEAD TIME in your class. Keep it moving.

16. Make yourself available for any questions, comments or concerns following an exercise session. This enables you to monitor your effectiveness as an educator and may also diminish the possibility of problems arising at a later time.

17. DO THE BEST THAT YOU CAN. Remember that you are there to **give** your students a workout NOT **get** a personal workout. Have fun!

18. **Remember!** What you do reflects upon you, your profession, and the FITLIFE program. **Be professional!**

ORGANIZING AN EXERCISE CLASS WORKOUT SESSION

All instructors and apprentices should be aware of the impact and impression left on clientele each time you teach a FIT*LIFE* exercise session. The typical FIT*LIFE* participant seeks guidance in health education, supervision in the betterment of their lifestyle and a functional, friendly, educational atmosphere that comfortably enables one to achieve success through enhanced exercise and interaction with other participants.

A concerted team effort to make the most of every minute of the exercise session should be a top priority when organizing your time. Careful planning, delegation of responsibility, following through on objectives and being "people oriented" are the hallmarks of a successful service program.

A FIT*LIFE* exercise session can be broken down into 7 basic components or activities: *Pre-activity, Introduction, Warm-up, Exercise, Floor work/Toning, Cool-down and Post-activity.*

Pre-activity

X Be 10 minutes early to class

X Set up equipment before clientele arrives:
Radio/tape Player - with music cued
Stations if have an interval class
Weight/mats/steps/cycles

X Greet and converse with clientele when they enter and prepare them to take resting HR and BP, if they desire.

Introduction

Introduce yourself to the class, explain what type of class you are teaching, how your are going to format the class, and what equipment is needed. Always ask if there are any injuries, pregnancies, or special cases you as the instructor should be made aware. Finally, ask if there are any questions or comments.

Warm-up

Overall time : 5-10 minutes

Movements: Use a combination of low intensity rhythmic movements that incorporate upper and lower body major muscle groups.

Stretching: Use static stretching to stretch out the major muscle groups of the body. Don't use the warm up to work on flexibility, but use gentle stretches that focus on areas that will be used during the exercise session.

Music: 124-140 bpm: UPBEAT and LIVELY music to get your clients psychologically ready and "pumped up" for their work out.

Cardiovascular Exercise

Overall time: 25-40 minutes

Movements: For all classes, begin slowly and gradually increase the intensity to a steady state. Distribute high impact moves (propulsions, jogging, etc) and low impact moves evenly throughout your class. Remember you can still get a very effective workout without putting unnecessary stress on the joints. Be creative! Incorporate several different kinds of combinations and practice good cuing techniques. Check the heart rate at appropriate times halfway through your cardiovascular segment and again at the end.

Music:	Step:	120-128 BPM
	Interval Class:	120-128 BPM
	Hi/Lo:	135-160 BPM
	Cycling:	124-130 BPM
	Slide:	120-130 BPM

The exercise session should follow the exercise and recovery protocol outlined in the progression chart designed for your class! *See Appendix A*.

Floor Work/Muscular Conditioning and Toning

Overall time: 5-10 minutes

Movements: Before taking students to the floor, use slow rhythmic movements (similar to those in warm up) to bring their heart rate down. Check the recovery heart rate before going to the floor to ensure it is safe (approximately 120 bpm). Use movements and exercises that are specific to which muscle group you want to focus on and will isolate the muscle. Be sure to balance your exercises and perform the same number of repetitions on each side.

Music: 115-135 bpm:

Cool-down

Overall time: 5-10 minutes

Movements: Use full range of motion static stretching of the major muscle groups AND those muscles worked during your activity/toning/floor work. Use good relaxation and breathing techniques.

Music: Slow, soothing, and relaxing music. (i.e., instrumental music)

Education: Use the last few minutes of class to educate the clients on health and fitness topics. Provide them with tips on fitness, wellness, health and other related topics. Use this time to educate and to allow for brief questions.

Post-activity

The instructor and apprentice will stay for questions, give compliments and encourage clients to return for the next session and to pursue good health practices.
Equipment must be secured and returned to its proper location. FITLIFE equipment is to be checked in following an exercise session!

Classroom lights must be turned off and doors closed and locked.

SELECTING EXERCISE CHOREOGRAPHY

A proper atmosphere is essential to insure optimal exercise enjoyment, desire, motivation and fitness improvement. Instructors/apprentices can greatly improve exercise performance with music and exercise movements that correspond with participant's level of fitness and motivational needs. The following suggestions may be useful in maximizing exercise effectiveness.

MUSIC: Consider the intent of the routine: warm-up, aerobics, calisthenics, etc.

Step:	120-128 BPM
Interval Class:	120-128 BPM
Hi/Lo:	135-160 BPM
Cycling:	124-130 BPM
Slide:	120-130 BPM

Make sure your music is at a volume level which will allow effective communication with the group.

Train your ear to be able to hear the 8 count in your music. Be familiar with your music so you can recognize extra beats in the rhythm.

Knowing your music and being able to recognize the 8 count will enable you to cue better as well as choreograph your class.

Select your music carefully. Be aware of music that may contain objectionable material.

CUING:

Types of Cuing:

1.Verbal

a. Anticipatory phrasing (3 or more words ie, "Listen up")

b. Count down (4,3,2,1)

c. "Ready, Set, Go" phrases

2.Musical (hearing the 8 count)

3. Visual - hand signals

4.Directional Cues - room markers (ie, right wall; water fountain)

ALWAYS USE A COMBINATION OF VERBAL AND VISUAL CUES!

In most instances, try to face the class for better communication. Complicated or directional moves may require the instructor to turn with his/her back to the class. If mirrors are available, the instructor and participants may feel comfortable with everyone facing the mirror.

Always make the student aware of a change in move prior to the next move. Always cue correct posture and body alignment throughout the entire class.

In using an eight count, cue changes from count five to eight and change on one.

CHOREOGRAPHY

Building Combinations: Your goal is to construct a 32 count combination. Eventually you will have a library of combinations that you can refer to when preparing for a class. You might use 4-8 combinations during your class depending if they are new to the class.

<u>Methods</u>

a. Linear (add on)

b. Set (AB:CD)

Guidelines and Sequencing:

Make the change between steps and between phases (i.e.: warm-up and aerobics) an easy transition. Incorporate all body parts throughout the routine using a full range of motion.

Build combos gradually allowing students to learn and master the move.

Change one thing at a time! Begin with the first move and repeat it until everyone can easily follow, then proceed to the next move until you have your 32 count combination. Don't make it difficult on participants by rapidly changing entire moves or getting up and down off the floor (this also affects their heart rate!)

Teach combinations in place and the travel with them (ie, forward, side, and back)

Use a variety of movements with different range of motions to distribute joint/muscle stress and workload. Changing a move can be easy just by changing the level or plane of the part being moved. Other variations to use to add variety include changing rhythm (double, single) or intensity. Keep it interesting by using the whole room, moving forward and backward, side to side, and changing directions.

Use short, simple transition steps for a mental and physical break.

Terminology:

STEP

Basic Step	Tap up Tap down	Hop Turn
L-Step	Repeaters	Diagonal
V-Step	Jacks	Straddle
T-Step	Lunges	Over the Top
A-Step	Turn Step	

AEROBICS

Marching	Squats/jacks	Grapevine
Jogging	Twists/chug	Box Step
Walking	Lunge	Skate
Step Touch	Pivot Turn	V-Step

Selecting Movement Patterns: Once the music has been selected, instructors must choose appropriate dance-exercise movements. The first consideration is whether the movement is safe. Even if an individual step is safe, the transition between that step and another may be hazardous. Therefore, instructors must also consider the safe sequencing of steps.

1. Avoid movements that result in hyperextension of any joint.
2. Do not repeat a movement more than 4 consecutive times on one leg; in other words, alternate every 16 counts.
3. Avoid flinging limbs at any time.
4. Make sure lateral foot moves are well controlled to avoid tripping or falling.
5. Be cautious of lateral moves that use crossover steps (such as grapevine), which can be particularly stressful to excessive pronators during the weight-bearing phase of the crossover.
6. Avoid movements with forward trunk flexion, especially those movements that combine forward trunk flexion and rotation.
7. Never stretch muscles ballistically while performing movement patterns.
8. Avoid changing directions rapidly. Transitions between complex steps may require a movement sequence in place before changing directions.
9. Avoid continuous movement that requires participants to remain on the balls of their feet for extended periods.

Progression: The routine should always be progressive, no matter one's fitness level. The goal is to achieve a steady state into one's training heart rate zone.

Start with simple moves and build into more complicated combinations, adding one thing at a time.

Establish a pattern that is easy to follow during the routine. This is most important in building combinations. The participants will feel more comfortable if they can pick up moves easily and anticipate a smooth transition.

Each class will have its own progression sheet to be followed over the entire program that incorporates frequency, intensity, and duration.

Posture During Exercise

Always cue correct posture and body alignment throughout the entire class.

Maintain good posture and body alignment throughout the class period. Key points to remember are:

- weight always over hips with shoulders aligned with hips
- knees and toes always going the same direction
- keep hips above the knees
- knees stay behind toes in a lunge or bent knee position

Be aware of alignment when stationary, when doing calisthenics, and when in motion.

Always make deliberate movements to isolate specific muscles and work opposing muscle groups (imbalance increases chance for injury).

Refrain from ballistic moves that are uncontrolled and use momentum. This increases chance of injury.

ABSOLUTE NO-NO'S:

- Holding the breath. Breathing should be relaxed through nose and mouth
- Forward flexion without support. This includes toe touches
- Locked joints
- Deep knee bends or any moves that bring hips lower than knees and put undue stress on the joints
- Hyperextension of neck or back.
- Head rolls should be only side to side or forward
- Lower back should always be protected with a pelvic tilt, abdominals contracted.

Attire

Workout clothes should be comfortable and modest. Shorts, t-shirts, tights, leotards, are all acceptable. Shoes are of primary importance. They should be lightweight and give sufficient shock absorbency. Good lateral and rear foot stability should be provided. Jogging shoes (or any shoes with black soles) and court shoes are not recommended.

GETTING TO KNOW YOUR CLIENTS

Invariably, the instructor will be confronted by an individual with a health condition not conducive to exercise. All instructors and apprentices should be aware of a number of health problems and coronary risk factors that should be evaluated prior to starting any vigorous exercise program. A physician referral must be on file for female clients 50 years of age or older, male clients 40 years of age or older, or with positive answers to the fitness questionnaire. No one will be allowed to exercise until this is completed **(exceptions must be approved by the FIT*LIFE* Coordinator or FIT*LIFE* Director.)** Check with the program coordinator if questions arise concerning this issue.

Each instructor will be allowed to review the PARQ's of clients that will be participating in their class. This will allow the instructor to be familiar with each client's age, prior and current exercise experience, medications, disabilities and limitations. It is the instructor's responsibility to review the PARQ's and be familiar with the individuals in their class BEFORE classes begin. Furthermore, the instructor must be familiar with the coronary risk factors that a participant may have in order to better educate and instruct the individual during exercise.

INDICATORS OF POTENTIAL HEALTH PROBLEMS

Individuals at any age with known cardiovascular, pulmonary or metabolic disease will need to undergo an exercise test before any exercise is prescribed or undertaken. Other health related conditions to be aware of include:

1. History of or current high blood pressure
2. Cigarette smoking
3. Abnormal resting heart rate
4. Family history of coronary heart disease
5. Obesity
6. Diabetes mellitus
7. Acute illness or fever
8. Uncontrolled heart rate or arrhythmias
9. Orthopedic problems
10. Asthma
11. Lack of coordination
12. History of physical inactivity
13. High blood lipids

Refer to APPENDIX E for drugs affecting normal exercise responses.
Refer to "ACSM Guidelines for Exercise Testing and Prescription" for the complete list of contraindication to exercise and exercise testing

KEEPING ACCURATE AND TIMELY RECORDS

What separates the FIT*LIFE* Exercise Program from other exercise programs is the philosophy of combining an enjoyable, exercise atmosphere with the latest scientific methods of quantitative evaluation of each participant. No longer can weight scales or height/weight charts alone be the sole indicator of exercise improvement. Additional information such as heart rate, blood pressure, body composition, muscular strength, and muscular endurance can provide a total picture of exercise improvement and participant performance status. FIT*LIFE* provides all clients the opportunity to find out this information relating to their physical fitness through two fitness assessments offered at the beginning and end of each semester session.

As instructors and apprentices, the collection of accurate records is vital to your client's health and well-being. It also allows you to monitor the effectiveness of your exercise program. Accurate and up-to-date records are a must in the daily performance of your exercise sessions as you constantly supervise each participant's present status and capabilities. You should be particularly aware of each client's prior exercise experience, medications, disabilities and limitations. *Accurate and timely records are essential for optimal exercise performance!*

In order to accomplish our goals of optimal exercise performance for each FIT*LIFE* participant, the following record keeping forms are required: (* *See Appendix B* for examples of the forms preceded by an asterisk (*). Other forms and handouts necessary for exercise class administration and evaluation are included in a collection of material called an "instructor packet" and will be given to the instructor during the week preceding the start of FITLIFE classes.

1. *Attendance Sheet (kept by instructor-to be typed at semester's end)
2. *Registration Form (kept in the Applied Exercise Science Lab office)
3. *Informed Consent Form
4. *Physician's Referral Form
5. *Exercise Prescription Worksheet (to be offered to all clients)
6. *Field-testing Results Form
7. *FIT*LIFE* Instructor/Class Evaluation Form

Attendance Sheet - Used to record participant's name, and to keep track of client attendance

Registration Form - Used by participant to enroll in a FIT*LIFE* exercise class. It gives vital information of client's present physical status and predisposition to injury or cardiovascular disease using the Physical Activity Readiness Questionnaire (P.A.R.Q.).

Informed Consent Form - Must be signed by the participant and a witness **before** any exercise is allowed. **This is a requirement of all exercise participants! No exceptions!** Completed forms are turned in to the secretary in the Applied Exercise Science Lab.

Physician's Referral Form - Required by males 40 years or over and females 50 years or over, or showing any contraindications to exercise at any age as assessed by the Physical Activity Readiness Questionnaire (P.A.R.Q.). The participant can submit the referral form, have a personal physician submit a letter of release on official stationary, or participate in a cardiovascular health profile provided at cost by the Applied Exercise Science Lab. **No exercise will be allowed until this requirement is fulfilled and the referral form is examined by the FITLIFE program coordinator. Exceptions must be approved by the FIT*LIFE* Coordinator or FIT*LIFE* Director.** Those with this form on file from previous enrollment in FIT*LIFE* need not repeat this requirement unless new medical developments warrant such action or 3 years has past since the last physical exam. Completed physician referrals (physicals) are to be turned in to the secretary in the Applied Exercise Science Lab and kept on file.

Exercise Prescription Worksheet - This form allows the instructor to help the client determine their predicted maximal heart rate (MHR) and the proper exercise heart rate range for optimal cardiovascular improvement. Again, **this form must be completed by the instructor before any exercise is started!** You cannot monitor proper heart rate levels in each individual client if you have not determined the optimal heart rate intensity. Over exercise and under exercise are the major causes leading to injury and non-improvement, respectively. If the client has had a stress test, use the measured maximum heart rate from the test data rather than the predicted heart rate. Each participant engaging in aerobic exercise should receive a completed copy of this form. The class instructor should also keep a copy.

All instructors of all classes must provide their clients with a written individualized exercise prescription, regardless of the mode of exercise, and a copy of that prescription should be kept by the instructor.

Field-testing Form - Allows the program to record both pre- and post-testing exercise data for each client who desires the testing. The form includes: client's name, class, sex, age, resting blood pressure, skinfolds measures and % body fat, 3 min step test recovery HR and estimated VO_2, sit and reach, sit-ups and pushup scores. This form must be accurate and complete for later evaluation of each exercise participant's performance, program effectiveness and research analyses. Testing sessions are held at the beginning and end of each semester. When each client has completed the battery of tests, a copy should be made for the client and the original should be given to the FIT*LIFE* exercise class supervisor.

Class Evaluation Form - Used to assess client's view of the exercise class organization and management, instructor and apprentice performance, and suggestions for improvement. This form is to be handed out to participants approximately four weeks prior to the conclusion of the exercise program.

DELEGATION OF RESPONSIBILITY

The FIT*LIFE* instructor maintains complete responsibility for the program in his/her assigned exercise class. However, delegating the daily tasks to your apprentice as he/she becomes experienced allows for better teamwork, enhanced quality of work and a greater learning experience as the apprentice assumes a greater role in the exercise program. Hands-on experience is the cornerstone of any successful service program. Daily tasks for the apprentice will include:

1. Obtaining participant heart rates before, during and following exercise.
2. Obtaining blood pressure prior to the start of an exercise session.
3. Securing proper equipment to be used such as mats and hand weights.
4. Recording accurate HR, BP and weight data.
5. Greeting participants as they arrive.
6. Providing exercise guidance throughout the class period so that participants can achieve full benefit from instruction.
7. Share in various teaching areas such as warm-ups, weight-training, or cooling down sessions.
8. Assist in data collection and tabulation following pre and post testing.
9. All apprentices are directly responsible to the instructors for attendance and class performance.

All apprentices will be required to begin teaching sections of their assigned class approximately half way into the semester. The 483 instructor will be given a check list that both the instructor and apprentice are required to sign after the apprentice completes their teaching assignment. It is imperative that the apprentice completes ALL assigned teaching tasks so they will be adequately prepared to instruct a FIT*LIFE* class the following semester.

SAFETY CONSIDERATIONS FOR THE FITLIFE PROGRAM

As administrators, instructors, and apprentices in the FITLIFE program, we have a moral and legal obligation to those enrolled in our classes or those to whom we administer fitness tests, to provide a safe environment. The following points (taken from an article by D.L. Herbert in *Fitness Management,* November, 1992) outline this obligation and how we **must** respond to the obligation. **We are obligated . . .**

1. To prepare and arrange an individualized exercise programs or evaluations tailored to suit the needs of the individual.

   ACTION: Each instructor will determine each of their client's target heart rate range by completing the exercise prescription worksheet. Provide your client with a copy of the worksheet and explain to them how to take an accurate heart rate. Make sure that you do not encourage individuals to exercise at an intensity or duration that may be harmful to them.

2. To **explain**, **train**, and **demonstrate** to clients the use and function of the various equipment in the facility.

   ACTION: Do not allow an individual to perform a movement in which you have not given previous instruction and demonstration. Likewise, do not allow an individual to exercise on a machine before he or she has received both instruction and demonstration on that particular machine.

3. To supervise and observe clients during the course of their participation and/or use of equipment.

   ACTION: Do not let clients exercise in a place or on a machine where they are out of visual contact. Make sure you are in visual contact with your clients at all times. Also, be observant.

4. To ensure that instructional staff is at least minimally trained in CPR.
ACTION: All students/instructors must hold a **current** basic CPR certification to be enrolled in KINE 483. Records of CPR certification for each instructor in the FIT*LIFE* program will be maintained by the FIT*LIFE* exercise class supervisor.

5. To ensure that a specific program and protocol for the handling of preventative and emergency procedures was taught and will be utilized in case of emergency

ACTION: Emergency plans are explained and CPR practice is held every semester. Participation is required by all FIT*LIFE* instructors. Emergency protocols are held once every semester in each FIT*LIFE* class and in the testing laboratory. Records of these activities will be maintained by the program coordinator.

6. To maintain records of emergency and preventative protocols.

ACTION: Emergency procedures are outlined in this document and have been approved by the medical director of the FIT*LIFE* program. The date and names of those who participate in mock emergency protocols are recorded and kept in a file in the program coordinator's office.

7. To discern adequate and reasonable health and medical information from prospective clients, with said duty continuing as medical, physical, and health conditions change.

ACTION: All FIT*LIFE* clients will complete a physical activity readiness questionnaire upon registration in a FIT*LIFE* class. **NO EXCEPTIONS**. After completing registration procedures, the registration staff of the FIT*LIFE* program will examine the P.A.R.Q. of each client. **A client whose P.A.R.Q has one or more "YES" answers to any of the questions or has special notes regarding health status will be required to secure a physician referral before he or she is allowed to exercise. Exceptions can only be given by the FIT*LIFE* program coordinator, program director, or medical director.** In addition, All P.A.R.Q.'s will be evaluated by the program coordinator and the FIT*LIFE* instructors during the first week of the semester (the week before FIT*LIFE* classes begin), or, in cases of late registration, as soon as the client has registered. **No client is to exercise until after his or her P.A.R.Q, and if required, the physician referral, is evaluated by either the program coordinator, program director, or medical**

director. The secretaries of the FIT*LIFE* program will construct and maintain a current list of each client that has not completed the above listed requirements.

Each instructor that has clients requiring special attention or a special exercise prescription will be counseled by the program coordinator. **It is your responsibility as an instructor in KINE 483, to continually monitor the health of each of your clients closely, making note of any developing condition that might predispose them to injury or danger.** In addition, be sure you are aware of any medications that your clients are taking. Observe your clients as they come into class each day. Do they look OK? Are they feeling well? <u>If not, do not let them exercise</u>. Also, get to know your clients on a personal basis and frequently ask about the health of a client that may have had problems in the past. This will better enable you to evaluate their health and capability to perform exercise, as well as make them less likely to be angry and take legal action against you, should they become injured or suffer a cardiovascular incident.

8. To take further measures and to educate instructors regarding the preparation of exercise programs for clients who are predisposed to injury or harm as a result of physical conditions which are known or should have been known through the exercise of reasonable diligence.

   ACTION: If an instructor has **anyone** in class that may have special needs regarding an exercise regimen, they should bring that to the attention of the FIT*LIFE* exercise class supervisor and the program coordinator immediately. Under no circumstances is an individual such as this to exercise without the permission and direction of the program coordinator.

In addition to the above points, we adhere to the guidelines for "emergency procedures" and "user screening" as outlined by The American College of Sports Medicine in its publication entitled *ACSM's Health/Fitness Facility Standards and Guidelines*, Human Kinetics Publishers, Champaign IL, 1992.

EMERGENCY PROTOCOL FOR
FITLIFE EXERCISE CLASS PROGRAMS

Minor Incidents (bruises, sprains, strains, etc.)

1. When the incident occurs, instructor should ask the victim to remain motionless and not attempt to move or stand.

2. The instructor should then assess the injury using standard first aid assessment procedures.

3. If necessary, the instructor should send the apprentice or a responsible class member to summon medical help. If you are in the Read-GRW complex, the apprentice should be told to go to the equipment checkout stand at the northernmost entrance to the Read building (Room 158). From this point, an ambulance may be summoned by calling 9-911, or first aid materials (ice, bandages, etc.) may be secured. If the facility is unmanned, the apprentice should summon help using the public phone on the south wall opposite the checkout window. If you are in the Netum Steed complex, the apprentice or class member should be sent to the front desk of the Applied Exercise Science main office or, if in the weight room, to the office of the head strength coach or one of the assistant strength coaches. If you are in the recreational sports complex (Hydrofit), notify the lifeguard on duty.

4. If necessary, the instructor should arrange for the victim to be transported home or to a medical facility.

5 After the situation is resolved, the instructor should interview witnesses and document the event using an accident report form.

6. The FIT*LIFE* EXERCISE CLASS SUPERVISOR and the FIT*LIFE* PROGRAM COORDINATOR should be notified as soon as possible.

Cardiac or Major Life/limb Threatening Emergency During Exercise Class

Introduction

In the event of a cardiac emergency during an exercise session, the procedures to be used in relation to the personnel present are outlined. Emergency treatment will be immediately instituted by those qualified personnel present. Such treatment will consist of Basic Cardiopulmonary Resuscitation and Basic First Aid.

1. The FIT*LIFE* class instructor is responsible for performing CPR or rendering necessary first aid until relieved by the appropriate medical personnel. Apprentices and qualified bystanders may be recruited when necessary.

2. The class apprentice will be responsible to activate the EMS system under the direction of the class instructor. If no apprentice is present, a class member or other qualified bystander may be recruited. The EMS activation procedure is listed in step 2 of the CPR procedure, and should be done immediately after unresponsiveness is determined.

CPR PROCEDURE

1. The cardiac arrest sequence of the American Heart Association as of 02/10 is:

    a. Determine unresponsiveness (Shake and shout")

    b. Activate EMS (Call 9-911) and give the following information:
        I. Location of the emergency
        ii. Telephone number from which the call is made
        iii. What happened
        iv. How many people need help
        v. Condition of the victim(s)
        vi. What aid is being given
        vii. Any other information requested

Remember, the victim whose circulation and breathing have been interrupted for less than four minutes has an excellent chance for full recovery if CPR is administered rapidly and followed by ACLS in the next four minutes. Therefore, early 911 access is crucial to the survival of the victim. Finally, the caller should hang up only after being told to do so by the EMS dispatcher.

c. Open airway using the head tilt/chin lift maneuver

d. Look, listen, and feel for breathing for 5 seconds

e. If the patient is not breathing, give two rescue breaths

f. Feel for the carotid pulse for 5 to 10 seconds

g. If no pulse, locate correct hand and body position

h. Begin compressions/ventilations at the correct rate and ratio:
    a. One-person: 30/2 at 100 compressions per minute
    b. Two-person: 30/2 at 100 compressions per minute

i. After two minutes (4 cycles of CPR), stop and assess patient for possible return of pulse

2. The individual initiating the EMS system will call from the EQUIPMENT CHECK OUT ROOM of the READ building room 158, or the Applied Exercise Science Laboratory or Netum Steed weight room for classes held in those facilities.

3. The individual initiating the EMS system will dial 9-911 to speak with the emergency personnel.

4. The individual initiating the EMS system will provide the following information to the emergency personnel over the phone in the following order:

    a. My name is _____.
    b. I am located at the Read Building (East side of Kyle Field on Houston Street) or Netum Steed Strength Facility (Southwest side of Kyle Field off of Wellborn Road), or wherever exercise session is being held, in room number ___ (state room number).
    c. There is a cardiac (or other) emergency.
    d. My phone number is 845-2624 (845-3997 for Kyle Field or Weight Room Exercise Programs).

5. The individual initiating the EMS system (apprentice) will be responsible for meeting the emergency rescue team outside the building and directing them to the site of the event.

6. Once responsibility for the victim has been turned over to EMS personnel, the instructor, apprentice, or other FIT*LIFE* personnel should obtain names and phone numbers of those that witnessed the incident.

7. The class instructor will attend the victim to the hospital. If not already done, he or she will also instruct the apprentice or a bystander to report the incident to FIT*LIFE* personnel as soon as possible. Transportation will be made under the direct supervision of the medical personnel present.

ANCILLARY MEASURES

1. Upon arrival at the emergency room, the patient will be discharged to the physician-in-charge. The FIT*LIFE* class instructor will attempt to notify the victim's personal physician from the hospital. It will be the duty of the personal physician or emergency room personnel to notify the family of a critical event.

2. The class instructor will attempt to contact a FIT*LIFE* supervisor from the hospital.

3. In conjunction with the FIT*LIFE* Program Coordinator, an incident report will be filed by the individual-in-charge at the time of the emergency and forwarded to the program director and medical director for review.

4. Following any event where clients are in need of emergency care, the entire staff will review the incident, a critique will be undertaken, conclusions drawn, areas of deficiency noted and corrected. This will be done within one week of the incident.

FIT*LIFE* CLINICAL TESTING AND LABORATORY POLICIES AND PROCEDURES

CLINICAL TESTING PROCEDURES

The FIT*LIFE* Program has both a clinical and field testing program. FIT*LIFE* offers fitness assessments for FIT*LIFE* Exercise Program members and other programs on campus. The fitness assessments include resting heart rate and blood pressure, body composition (skinfold), 3 minute step test to estimate cardiovascular fitness, sit-up and push-up muscular endurance tests, and flexibility. The clinical testing program is housed in the Applied Exercise Science Laboratory and offers comprehensive health assessments to faculty, staff, and students of Texas A&M University, Bryan/College Station City personnel, and the community at large. Health assessments include graded exercise testing, exercise prescription, various laboratory assessments of cardiovascular disease risk including a complete blood profile, assessment of pulmonary function, assessment of body composition, muscular strength and muscular endurance assessments, and nutritional guidance.

The following chapter will detail the clinical and field testing procedures that are performed in both the FIT*LIFE* Program and the Applied Exercise Science Laboratory. **It is the student/lab personnel's responsibility to thoroughly understand each test procedure and safety precautions. Each student must be able to conduct all tests accurately prior to the administering any of the following tests.** Each student will be evaluated on their ability to correctly follow clinical and field tests procedures before administering any tests to clients.

No laboratory activity involving exercise of any kind, phlebotomy, or hydrostatic assessment of body composition will be conducted unless a qualified laboratory supervisor is present.

HEART RATE

Being able to accurately determine heart rate prior to, during and following exercise is essential for participant safety in keeping within target heart range, and validity when determining improvements in cardiovascular fitness. In each FITLIFE exercise class, individual heart rates should be determined on each person as they enter the room, preferably following at least two minutes of quiet relaxation and prior to ANY exercise or warm-up. An accurate resting heart rate (RHR) will allow you to calculate each individual's target heart range assuring a wide margin of safety and optimal exercise intensity. For accurate calculation of the RHR for the exercise prescription, encourage participants to take their RHR prior to rising from bed in the morning.

Heart rates can either be taken by radial or carotid palpation by the instructor/apprentice until each individual shows competency in monitoring their own pulse. Following initial RHR and warm-up, heart rate will be taken and recorded on the exercise data sheet at 1) the beginning of exercise, 2) in the midpoint of exercise and, 3) at the end of exercise following the cool-down phase. Instructors can check pulse rate at any time during the session for self-monitoring of participant's intensity of exercise. It is suggested that instructors/ apprentices be familiar with typical heart rates usually encountered during exercise and recovery to determine whether participants are monitoring their HR correctly at any given time. The instructor should be aware of any medications that might affect exercise heart rate.

BLOOD PRESSURE

Theory

Blood moves through the vascular system from a region of high pressure (right or left ventricle) created by contraction of the heart to regions where pressure is progressively lower (arteries, arterioles, capillaries, veins, right or left atrium). Without the existence of a pressure gradient, blood does not circulate. The rate of blood flow is directly proportional to the magnitude of the pressure gradient. Due to the intermittent contraction of the heart, blood pressure in the arteries is constantly changing and oscillates between a high (systolic) that occurs just after the heart contracts to a low (diastolic) that occurs just before the heart contracts again.

Blood flow through the vascular system is retarded by friction between the blood and blood vessel walls. This resistance to flow is a function of the radius and length of the vessels through which the blood must pass, and the viscosity of the blood. The rate of blood flow is inversely related to the magnitude of the peripheral resistance.

During exercise, the blood pressure in the arteries increases as the heart contracts more rapidly and forcefully. Systolic blood pressure is affected most by the increased output of the heart and increases in direct proportion to exercise intensity and cardiac output. In contrast, resistance to blood flow decreases during exercise because of dilation of small arteries and arterioles in the active muscles. This causes a more rapid movement of blood out of the arteries and a more rapid fall in arterial pressure during diastole. As a result, the diastolic pressure stays almost constant or increases only slightly even during intense rhythmic exercise.

Many things can influence blood pressure. In general, these influences can be grouped into physiologic/internal and environmental/external factors. Some of the factors that affect blood pressure are as follows: cardiac output, peripheral resistance, vessel condition or elasticity of the vessel, total blood volume, blood viscosity. These are physiological factors which can cause a change in blood pressure. Some environmental factors which also affect blood pressure are: body position, exercise, temperature, altitude, emotions, food, and drugs.

Hypertension: excessively high blood pressure. Many suffer from this condition of unknown origin. Tends to be diet-related in that sodium causes fluid retention creating a hypertensive condition. Dangerous if uncontrolled.

Hypotension: unusually low blood pressure. It is usually an indicator or insult of injury to the body. Conditions such as shock, myocardial infraction and drugs can create hypotension. Standing very quickly after lying down or sitting can also create a drop in blood pressure.

Korotkoff Sounds: the sounds heard in the stethoscope marking the different phases of blood pressure.

Phase I - First appearance of a thumping sound
Phase II - A murmur or swish heard
Phase III - Crisper sounds increasing in intensity
Phase IV - Sound becomes muffled Phase V - Sound disappears

For adults the first sounds mark systolic blood pressure and the point where sound becomes muffled (Phase IV) marks diastolic blood pressure. Listen carefully for the other sounds but be sure to note Phase I, IV, and V. Phase IV and V may be inseparable at rest but are often widely separated during exercise or in young children. For this reason, the AHA recommends that pressures corresponding to both Phase IV and V be recorded.

The standard method for reporting blood pressure is to report the systolic blood pressure over the diastolic blood pressure, i.e. systolic/diastolic IV **or**, according to the AHA, systolic/diastolic IV/diastolic V.

Pulse pressure is the difference between the systolic and diastolic pressures (SBP - DBP). Therefore, a normal blood pressure of 120/80 would reflect a pulse pressure (PP) of 40 mmHg.

The overall driving pressure for the circulatory system is, in reality, the mean blood pressure (MBP). This is difficult to measure but is often estimated as:

MBP = diastolic BP + 1/3 PP.

Measuring Blood Pressure

It is standard procedure in the lab to constantly monitor blood pressures of all subjects. To achieve this, blood pressures are taken while at rest, in the supine, sitting and standing positions, and during exercise. Most often the subject exercises on a treadmill but occasionally circumstances will find the subject exercising on a bicycle ergometer.

Measuring BPs is a skill, and as with any skill, constant practice is required to become proficient. Practice taking BPs on both arms both at rest and during exercise to be prepared for any situation which may arise in the lab.

Equipment Needed

Sphygmomanometer (mercury or aneroid)
Stethoscope
Blood pressure norms (see Appendix C)

1. Instruct subject to sit down.

2. Locate the brachial artery, which is near the surface at the antecubital space at the elbow, apply moderate pressure, and locate the pulse of the subject. (When first learning the procedure, you might want to mark this spot with an "X" to help in locating the proper position for further BP measurements.)

3. Place BP cuff on arm of subject.
   a. Hold cuff so that:
   I. Velcro on cuff is on top.
      ii. Brachial artery marker (white mark) is facing toward you.
   b. Place cuff on arm so brachial artery marker lies above "X" on arm.
   c. Wrap the rest of the cuff around the arm and secure with the velcro.
   d. Place cuff just high enough on arm to allow the stethoscope to lie flat on the arm and not be impeded by possible bending of the elbow (about 2 cm above the "X").

4. Place stethoscope in ears - angling the earpieces so they are facing the forward portion of the ears. With the earpieces facing the back of the ear, the sounds may be muffled and inhibit your ability to hear a <u>good</u> sound.

5. Place the flat diaphragm of the stethoscope on the "X".

6. Turn knob, located at the base of the pressure bulb, to make sure it is closed to allow you to pump up cuff.

7. Pump the cuff up to about 100 mm Hg and listen for a sound. Do not release pressure at this point! This is done to make sure you have the stethoscope on the proper location on arm. For some fit individuals even 100 mm Hg may be too high.

8. Once sound is heard, continue to pump cuff up to about 160 mm Hg and slowly release the valve - approximately 2 mm/sec.

9. Watch the mercury fall and listen for the proper sounds, which are identified as Korotkoff Sounds.
   a. Phase I - First appearance of a thumping sound. (SBP)
      - marks the systolic blood pressure
   b. Phase II - A murmur or swish heard.
   c. Phase III - Crisper sounds increasing in intensity.
   d. Phase IV - Sound becomes muffled.
      - generally Phase IV is regarded as the best index of DBP.
   e. Phase V - Sound disappears.
      - in some individuals, especially during exercise, the sound never completely disappears.

10. When all sounds are heard, release pressure on cuff by turning knob attached to base of bulb. If you miss any of the sounds, attempt measurement again. If you are unable to hear any of the sounds the second time, do not attempt a third right away.

11. Record the pressure in **mm Hg** corresponding to Phase I (SBP) and Phase IV (if possible) or Phase V (DBP) on appropriate paperwork, i.e. 148/78.

12. If Phase V goes to zero, record the pressures corresponding to Phases I, IV, and V if possible, i.e. 148/78/0.

13. Unwrap bladder and remove from arm.

WEIGHT & HEIGHT MEASUREMENT PROCEDURES

Equipment Needed

Calibrated Scale
CHP Data Sheet (yellow)

1. Subject should wear proper attire.
   a. Men - gym shorts or swim suit
   b. Women - gym shorts and T-shirt/blouse or swim suit

2. Pull up height measuring arm.

3. Ask subject to step up on scale platform facing the wall.

4. Adjust scale until correct weight is obtained.

5. Record weight in pounds (black numbers on scale) on yellow CHP DATA SHEET.

6. Have subject turn around on platform and face away from wall.

7. Instruct subject to stand up as straight as possible without rising up on toes.
   a. Feet together
   b. Don't slouch
   c. Shoulders back
   d. Eyes straight ahead

8. Lower height measuring arm until lever rests horizontally on subject's head.

9. Ask subject to step off scale.

10. Read height, in inches, from scale and record on yellow CHP DATA SHEET.

BODY COMPOSITION AND ANTHROPOMETRIC ASSESSMENTS

Although anthropometric measurements for the determination of body composition are only estimates, you can provide individuals with a meaningful evaluation of present lean body mass: fat ratio and its relationship to proper diet, exercise, and coronary heart disease. Students will acquire the skills necessary to determine body composition by: 1) anatomical skinfold technique and 2) hydrostatic assessment technique.

Equipment Needed

CHP Data Sheet (yellow)
Felt-tip pen (optional)
Nose plugs for hydrostatic assessment (optional)
Skinfold calipers
Anthropometric measuring tape for circumference measures

Skinfold Measurements

Theory

The most widely used method of determining percent body fat is based on the thickness of skin folds. A major advantage of skinfold measurements is it is quickly and easily obtained. In our lab we use equations developed by Jackson and Pollock to determine body density (see Appendix D) which is then converted to percent body fat by use of the Brozek equation (see Appendix D).

The accuracy of skinfold measurements can be affected by many factors, including non standardization of sites, use of different calipers, different testers, and the use of different equations. However, inter-tester error can be reduced to less than 1% fat calculated error when testers practice together and standardize their testing procedures.

Skinfold Measures Procedures

1. The subject must furnish swimming attire, light weight swimming trunks for men and two-piece suits for women are required.

2. With a felt-tip pen, mark the anatomical location of the skinfold and girth measures. (See Anatomical Landmarks for Skinfolds and Girth Measures in Appendix D.) All measures should be taken on the subject's right side.

   a. Pick up the subject's skinfold between your index finger and thumb of your left hand, making sure that your fingers are in the same "pinching configuration" as the calipers. Be sure that you have two layers of skin and the underlying fat only. Allow the skinfold to follow the natural stress lines of the body. If you doubt that you have a correct skinfold, have the subject contract the underlying muscle; if you have a correct skinfold you will be able to retain your grasp. The fold should be held between the fingers when the measurement is made.

   b. Apply the calipers to the fold about 1 cm from the fingers where the fold is parallel. The pressure on the fold must be exerted by the calipers only - Not too close to the fingers!

   c. Measure all skinfolds to the nearest 0.5 mm. Take the mean of two measures which are within 2 mm. Take all measures once and then repeat the entire sequence until two measures of the desired accuracy are obtained.

   d. Record your data accurately on your Data Sheet.

3. Enter the data on the computer to determine the body fat percentage. See Appendix H for computer instructions.

Circumference Measures of Body Composition

Measure the required girths as outlined below, making sure to measure all circumferences in a horizontal plane. Using the anthropometric measuring tape, pull the tape taut so that it closely follows the contour of the skin, but not so taut that it compresses and indents the skin or adipose tissue.

a. Waist: with the subject's abdomen relaxed, a horizontal measure is taken at the level of the narrowest part of the torso.

b. Hip: With the subject standing erect naturally, a horizontal measure is taken at the maximum circumference. The technician should squat at the side of the individual so that maximum extension of the buttocks can be seen.

HYDROSTATIC ASSESSMENT OF BODY COMPOSITION

Theory

The underwater weighing technique for measuring body density is based on Archimedes' principle of displacement. It is known that an object displaces its own volume in water. The densities of bone (3.0 gm/cm) and muscle tissue (1.06 gm/cm) are higher than water (1.0 gm/cm), while fat is less dense than water (see Appendix D). Therefore a person with more bone and muscle mass will weigh more in water and thus have a higher bone density and lower percent fat. The volume of the body can be calculated by a standard formula and the individual's body density determined. The air left in the lungs and changes in the density of water due to changes in temperature must also be accounted for.

As with skinfold measurements, various factors may result in errors in calculation of the percent body fat. Although non standardization of technique results in a large portion of the errors, inconsistency in reading the scale has proven to also be a major contributor. Only by continuously practicing a standardized technique will the tester be confident in reducing these errors.

Procedure

1. Upon scheduling a subject for this procedure, instruct them to abstain from eating for at least 4 to 6 hours prior to the test.

2. Fill the tank with fresh, warm (34-36 C) water. Faucet is found behind white panel on wall near tank entrance. Water temperature can be monitored by gauge here also. (When filling tank on testing days, fill tank keeping water temperature at 37 - 38 C to allow for cooling off of water from beginning of testing session to the time the tank will actually be used.) Add 6-8 ounces of liquid chlorine to tank just as filling begins to allow it to disperse well in water.

3. When the subject arrives, carefully explain all procedures and have them sign the informed consent. **If you are weighing this person during a CHP testing day, check the individual's folder to make sure he had a negative (normal) GXT. If his/her GXT was positive <u>DO NOT</u> weigh them underwater.**

4. Have the subject retire to the dressing room, change clothes, empty the bladder and bowels, and report back to the testing area.

5. Determine skinfolds if not previously measured.

6. Estimate the residual volume (RV) (see Appendix D).

7. Record the height and weight of the subject wearing the bathing suit only. Record the weight to the nearest 1/4 pound.

8. Follow Calibration Procedures on the computer.

9. Measure and record the water temperature just prior to each test even if several are done in sequence. The water temperature should be between 34 and 36 C just prior to subject entry. Note and record the water density at this temperature (see Appendix D).

10. Instructions to subject:
    a. Enter the water, submerge and shake hair free of all air bubbles - bathing suit as well. The water level should be about shoulder depth when seated.
    b. If necessary, place weight belt around waist and have a seat on the chair. (Reason for belt: Some individuals have a tendency to float off chair, belt is to help these people maintain contact with chair for a more accurate reading.)
    c. Keep feet on bar throughout test.
    d. Place hands across chest or hold on to the bars on the sides next to the legs.
    e. To help you get out of the water faster, we ask you to do two things:
       1. Exhale between 50%-75% of your air above the water before submersion.
       2. While continuing to exhale remaining air in the lungs, submerge slowly, smoothly, and completely to minimize wave formation and expedite the procedure.
    f. While totally submerged, completely force <u>all</u> the air from your lungs.
    g. When we see no more air bubbles appear around your mouth, we will take a reading and bang on the tank wall as your cue to come up out of the water. If you need to come up sooner, feel free to do so.
    h. You will need to repeat the procedure 7 times. (The reason for 7 is that people have a tendency to become more comfortable in the water and give better readings.)

11. Instructions to technician:
    a. Be sure the subject is completely submerged, keeps feet on the bar, and expels air completely.
    b. Take a total of seven weights and record the mean of the highest three as the actual underwater weight.

12. When all subjects have been tested, release the water from the tank.

THE THREE-MINUTE STEP TEST (GOLDING, 1)

Various tests for determination of cardiovascular fitness have been incorporated into health assessment programs. Of these, the step test has been used successfully for mass testing and in circumstances dictating limited equipment and resources.

The Three-Minute Step Test can be used very successfully in mass testing, but also as a self test or an addition to a test battery. Minimal equipment is required and participants can learn to administer it themselves. When used as a self test the participant can count the carotid or radial pulse, however, when done as a part of the test battery it should be done as described here. A thorough understanding of the protocol is absolutely essential in order to elicit an accurate recovery heart rate and subsequent VO_2 on exercise participants.

Equipment Needed

12-inch high, sturdy bench
Metronome set at 96 bpm (24 steps per min.)
Timing clock for the 3-minutes, and a recovery clock (these may be the same).

Procedure

1. Demonstrate the stepping. Participants will face the bench and in time with the metronome step one foot up on the bench (1st beat), step up with the second foot (2nd beat), step down with one foot (3rd beat), and step down with the other foot (4th beat).

2. Explain the test to the participant and the importance of sitting down quickly at the end of three minutes and resting quietly for one minute so that the heart rate can be taken. Make sure you as the tester can locate their radial pulse (use their carotid pulse if their radial pulse cannot be found).

3. Position the participant facing the bench and allow him / her to pick up the beat of the metronome.

4. Begin the test and begin keeping time. Check the rhythm and correct if necessary. Tell the participant as time passes, "One minute, two minutes," etc.

5. When 20 seconds remain tell the participant that he/she is to sit down quickly at the end of the stepping and wait for the tester to take a heart rate. Put stethoscope in ears and prepare recovery timer. On the last step it is helpful to say "Last step -- up, up, down and sit down."

6. When the participant sits down, immediately place the stethoscope on the participants chest OR find his/her radial pulse and begin the heart rate count and count for one full minute. **The recovery rate must be started within five seconds or the heart rate will be significantly different.** NOTE: Pay close attention to the heart's rhythm which can change suddenly during recovery. It is easy to lose count. The one-minute count reflects the heart's rate at the end of stepping as well as reflecting the rate of recovery.

7. The total one-minute post-exercise heart rate is the score for the test and can be recorded and compared to norms or previous test results, if appropriate. Score the total one-minute post-exercise heart rate, in beats per minute.

MUSCULAR STRENGTH AND ENDURANCE TESTING

The Handgrip Test is utilized in the FIT*LIFE* Program to determine upper body strength. The Sit-up Test and the Push-up Test are utilized to determine muscular endurance. Students should be aware that these tests are modifications of exercises often performed daily, and insuring that participants perform the test properly according to the following procedure will result in valid results and the avoidance of retesting. Also note that the Push-up Test procedure is modified according to male and female and should be strictly adhered to by all participants **(Exception: Those individuals with orthopedic or physically limiting problems.)**

HANDGRIP

This will be a measure of handgrip strength using a handgrip dynamometer. This test is best if performed before the pushups.

1. Instructions to subject:
   a. Grip dynamometer in dominant hand.
   b. Hold arm next to side.
   c. Squeeze as hard as possible.

2. Read the max effort on the gauge of dynamometer.

3. Repeat 3 times allowing a 30-sec rest between trials.

4. Record 3 efforts on CHP DATA SHEET (YELLOW).

5. Repeat procedures with other hand and record on yellow data sheet.

TIME TRIAL SITUPS

In the 1-minute sit-up test, the subject lies on their back with arms crossed against their chest and the knees bent at approximately 90 degrees. A partner or the tester holds the ankles to give support. Within a 1-minute period, the subject performs as many complete sit-ups as possible. On the lifting (contraction) phase of the sit up, the subject's shoulder blades should come off the mat and their elbows should touch mid thigh. On the release phase of the sit up, the subjects shoulder blades should return to the mat to complete one correct sit up. The subject should not hold his/her breath during this test, but rather should exhale during the lifting phase and inhale on the release phase.

Equipment Needed

CHP Body Comp/Strength Data Sheet (yellow sheet)
pencil
stopwatch
exercise mat (if floor not carpeted)

1. Technician prepares the station by placing an exercise mat on the floor (optional).

2. Explain to the subject that he will be attempting to perform as many sit-ups as possible in one minute. ***Remember** - only count the number of correctly performed sit-ups!

3. Demonstrate the proper procedure and body position for the subject.

4. The feet must be held to the floor by the technician who also counts the number of sit-ups the subject successfully completes.

5. Once the subject is in this position, the technician will say "GO" while simultaneously starting the stopwatch.

6. Subject begins performing sit-ups by lifting the head and shoulders off the floor and touching the opposite elbow to the knee.

7. The shoulders **must** touch the floor each time, but the head does not need to.

8. Once one minute has elapsed, the technician will say "STOP" and the subject should stop.

9. Record the number of correctly performed sit-ups on the Body Comp/Strength CHP Data Sheet.

Back Strength

Equipment Needed?

CHP Data Sheet (yellow)

Pencil

Stopwatch

Rationale/Purpose

The back strength machine is used to gauge muscular strength of the back.

Reference?

Pollock ML, Wilmore JH, Fox, SM. Health and fitness through physical activity. New York: John Wiley and Sons, 1978.

Special Consideration?

Participants with high blood pressure should **not** take this test.

Procedure

1. The participant steps on to the footstand and holds the handle in a natural grip. Adjust the length of the chain so that the participant can bend forward at 30 degrees.

2. Once the participant is in this position, the test technician will say "GO" while simultaneously starting the stopwatch. Technician 2 should watch the indicator on the scale.

3. The participant begins by raising the upper part of the body while pulling up the handle gradually without bending their knees.

4. Once the indicator stops moving-ups the technician will say “STOP”participant and the participant must stop immediately. The technician will then ask technician 2 what

the scale reads and will record this number on the participant's score sheet.

Terminating the Test

This test is terminated when:

1. Participant is done
2. Improper form is used.

Recording the Results

The test technician is to record the value on the scale on the participant's score sheet.

Points to Note

Make sure the participant:

- is warmed up before testing
- does not jerk the handle

TIME TRIAL PUSHUPS - MEN

Equipment Needed

CHP Data Sheet (yellow)

Pencil

Stopwatch

Rationale/Purpose

The pushup is used to gauge muscular strength and endurance of the upper body.

Reference

Pollock ML, Wilmore JH, Fox, SM. Health and fitness through physical activity. New York: John Wiley and Sons, 1978.

Special Consideration

Participants with high blood pressure should **not** take this test.

Procedure

1. The participant lies face down on the floor and places the hands directly under the shoulders. The arms are then fully extended. The shoulders, back, buttocks, and legs must be held straight in correct body alignment from head to heel throughout the test.

2. Once the participant is in this position, the test technician will say "GO" while simultaneously starting the stopwatch. The second technician should place his/her fist on the floor directly underneath the participants chest and count the number of correct push-ups performed.

3. The participant begins the push-ups in the UPRIGHT position and starts the

movement by bending the elbows and lowering the entire body until the chest touches the technicians fist on the floor. The participant's back must be straight

4. Upon touching the chest to the technician's fist, the participant returns to the starting position by fully extending the arms and lifting the body.

5. The participant may pause or rest during the one minute in the UPRIGHT position. The clock does not stop during the pause.

6. Once one minute has elapsed, the test technician will say "STOP" and the participant must stop immediately. The technician will then ask technician 2 how many push-ups the participant has done correctly and will record this number on the participant's score sheet.

Terminating the Test

This test is terminated when:

1. One minute has elapsed
2. The participant shows signs of exercise intolerance/ fatigue
3. Improper form is used.

Recording the Results

The test technician is to record the number of push-ups the participant has successfully completed in the push-up section of the participant's score sheet.

Points to Note

Make sure the participant:

- lets his chest touch his partner's fist
- does not stick his hips up into the air
- does not roll his hips to the floor
- keeps his hands shoulder width apart
- Exhales as he extend their arms to the upright position.

MODIFIED PUSH-UPS - WOMEN

Rationale/Purpose

The push-up is used to gauge muscular strength and endurance of the upper body.

Reference

Pollock ML, Wilmore JH, Fox SM. Health and fitness through physical activity. New York: John Wiley and Sons, 1978.

Procedure

1. The participant lies face down on the floor, places her hands directly under her shoulders, and bends her knees at a 90 degree angle. The arms are then fully extended. The shoulders, back, and buttocks must be held in correct body alignment (straight from head to knees) throughout the test.

2. Once the participant is in this position, the test technician will say "GO" while simultaneously starting the stopwatch.

3. The participant begins the push-ups in the UPRIGHT position and starts the movement by bending the elbows and lowering the entire body until the chest touches the floor. The participant's back must be straight (no arching or sagging).

4. Upon touching the floor with the chest to the floor, the participant returns to the starting position by fully extending the arms and lifting the body.

5. The participant may pause or rest during the one minute in the UPRIGHT position. The clock does not stop during the pause.

6. Once one minute has elapsed, the test technician will say "STOP" and the participant must stop immediately. The technician will record the number of push-ups the participant has done correctly on the participant's score sheet.

Terminating the Test

This test is terminated when:

1. One minute has elapsed
2. The participant shows signs of exercise intolerance/ fatigue
3. Improper form is used.

Recording the Results

The test technician is to record the number of push-ups the participant has successfully completed in the push-up section of the participant's score sheet.

Points to Note

Make sure the participant:

- lets her chest touch his partner's fist
- does not stick her hips up into the air
- does not roll her hips to the floor
- keeps her hands shoulder width apart
- Exhales as she extend their arms to the upright position.

SIT AND REACH TEST

Rational/Purpose

Adequate range of motion in all joints is required for normal musculoskeletal function. Flexibility in the lower back/posterior thigh region is of particular concern because lack of flexibility in this region is associated with the increased risk for development of chronic lower back pain. For this reason, we administer a specific flexibility test which gives a relative indication of the flexibility of this region.

References

Golding, L.C., Meyers, C.A., & Sinning, W.E. The Y's Way to Physical Fitness. Chicago: National Board of YMCA's, 1980.

Equipment Needed

Measuring box
Exercise mat
CHP Data Sheet (yellow)

1. Instruct the subject to stretch before test begins.
   a. The calf stretch - stand with back heel on ground and lean toward the wall. Hold for at least 20 seconds; switch legs.
   b. The Achilles tendon - in same position as above, bend the back knee, keeping heel on the ground. Hold for at least 20 seconds; switch legs.
   c. The hamstring - Put one foot up on a low wall, or bench, or other support. Keeping legs and back straight (knees slightly bent), bend forward gently. Hold for at least 20 seconds; switch legs.
   d. The quadriceps - Support self against wall with one hand. With free hand, gently pull one heel toward buttocks. Keep both back and thigh vertical. Hold for at least 20 seconds; switch legs.

2. Position box against a wall with wide portion of sliding bar flush against the front of the box.

3. Place mat in front of box for subject to sit on while performing the test.

4. Demonstrate correct procedure and body position for subject.

5. Instruct subject to remove shoes and have a seat on the mat with feet against the box on either side of the divider on the box. The participant's heels must be placed so they touch the edge of the sit-and-reach box.

6. Describe test to subject while performing a demonstration of proper technique.

7. Instruct subject to slowly stretch forward, keeping knees from bending, with fingers of both hands outstretched toward sliding portion of box. (It may be necessary for technician to hold subject's knees in proper position.)

8. The technician should suggest to the participant that exhaling and dropping the head between the arms when reaching should help to increase distance. The participant should **not** hold his/her breath.

9. Instruct subject to continue slowly stretching forward while pushing the moveable bar on the box as far as possible.
   a. Be sure to instruct them not to lunge forward and try to hit the bar forward!
   b. Do not allow the subject to push the sliding bar forward by quick extension of the fingers or "crawling" of the fingers
   c. Do not allow the subject to stretch or lead with one hand.
   d. If subject is able to push bar so far that it stops against the wall, turn it backwards to allow them to continue the test.

10. When they can stretch no farther, instruct them to relax.

11. Read the measurement on the box indicating how far they were able to push the bar and record in appropriate position on CHP DATA SHEET. (Read from the portion of the bar that was originally flush with the end of the box.)
    a. Read from the portion of the bar that was originally flush with the end of the box.
    b. Read the box beginning with -3 and proceeding to zero on through 12.
    c. If they were unable to reach the bar, determine the number of inches away from zero and record as a negative number.
    d. If they pushed the bar in the negative range, be sure to record the figure and the negative sign!

12. Repeat the procedure a total of 3 times.

Terminating the Test

The test is terminated when:

1. The participant has completed three attempts to reach as far forward as possible
2. Shows signs of exercise intolerance.

Recording the Results

Record the length in inches of the farthest reach on the participant's score sheet.

Points to Note

Make sure that the participant:

- does not bounce
- does not bend knees
- keeps arms straight
- places heels at baseline and keeps them there
- has shoes off during the test
- does not increase the distance by finger extension

ECG PREPPING PROCEDURES

Proper prepping techniques before electrode placement are essential for recording high quality ECG's during exercise. Failure to prepare the skin properly and consistently for an exercise test will result in an ECG signal that cannot be continuously monitored or accurately interpreted because of artifact.

1. Have the subject disrobe to the waist and lie down, face up on the prep table. Females should be wearing swim or exercise bra.

2. Explain prep procedures to subject before prepping.

3. Identify the areas to be used for electrode placement and mark with an 'X' using a felt-tip pen.
   a. RA (right arm) and LA (left arm) located at the base of the shoulder against the deltoid border 2 cm below the clavicle.
   b. RL (right leg) and LL (left leg) Place the electrode at the point of intersection of a vertical line from the respective arm electrode and a horizontal line 2 cm above the umbilicus.
   c. V1 - fourth intercostal space at right margin of sternum.
   d. V2 - fourth intercostal space at left margin of sternum.
   e. V3 - midway between position V2 and V4
   f. V4 - fifth intercostal space at junction of left midclavicular line.
   g. V5 - at horizontal level of V4 at left anterior axillary line.
   h. V6 - at horizontal level of V4 at mid-axillary line.

4. Shave the area where the electrodes are to be applied if necessary.

   a. When preparing the surface of the skin for electrode placement, all chest hair in the vicinity of the electrode placement site must be removed. This is done by first using a clipper to remove the excess hair, then shaving the area with a razor specifically designed for "dry" shaving. If someone has particularly dirty or oily skin, use an alcohol prep wipe to clean the area.

b. When shaving the chest, use long purposeful strokes, being careful not to break the skin. If, however, the skin is broken and bleeding occurs, **do not touch the area with an ungloved hand.** Obtain a pair of rubber gloves from the phlebotomy area and continue the skin preparation procedure.

c. **Dispose of the razor after each client (do not use the same razor for the next client, regardless of whether or not you have used both sides of the prep razor).**

5. Rub each site lightly (about 8 strokes) with ECG Quick Prep sandpaper tape. The skin should turn slightly red.

6. Affix electrode to the site.
   a. CHECK electrodes before application to be sure they are not dried out.
   b. Peal off outer layer of electrode.
   c. DO NOT touch gel in center of electrode.
   d. Place electrode on site by slightly folding up opposite edges of electrode so gel will make contact with skin first.
   e. Rub around outer edge of electrode to make sure it is firmly affixed to skin.
   f. DO NOT push down in center of electrode where the gel is.

7. Attach the lead wires from the ECG machine to the electrodes.

8. Measure and record a supine blood pressure (unless it has been recorded earlier by the physician on the green screening sheet).

9. With subjects legs uncrossed, record the supine 12-lead ECG - Press "12-Lead". Note the quality of the tracing and correct the problem if the tracing is not perfect.

10. Before exercise begins, record a pre-exercise blood pressure and 12 Lead ECG while the client is straddling the treadmill belt.

11. Instruct client as to the exercise protocol he/she is about to undergo (blood pressures and RPE's taken every 3 minutes, increase in speed and grade, etc.)

12. Begin the graded exercise test protocol.

GRADED EXERCISE TEST (GXT)

TREADMILL

Equipment Needed

Electrodes and skin prep supplies
Quinton 3000 ECG machine
Quinton 65 Treadmill
Sphygmomanometer
Stethoscope
RPE Chart

Safety Guidelines

When monitoring the ECG during a graded exercise test or laboratory activity, **any and all abnormalities, arrhythmias, or indications of ischemia should be immediately reported to the attending laboratory supervisor (lab director, lab coordinator, or graduate student) or the cardiologist in attendance.**

If the person on the treadmill becomes non-respondent or collapses, the test should be terminated immediately. Standard first aid and CPR procedures should be followed in accordance with the "Life Threatening Emergency" paradigm delineated in this document. The attending laboratory supervisor should be notified immediately.

ECG / Blood Pressure Technician Responsibilities

Preparations for Testing

a. Make sure ECG machines have sufficient paper supply.

b. Set up prepping stations. Abrasion paper
Electrodes
Razors (shavers)
Crash Cart & Defibrilator * Note - these items will be checked every test day by the FITLIFE coordinator for proper operation and outdated medical supplies

c. Review medical history, previous test results (if available), pre-exercise physical, and HEALTH & LIFESTYLE HISTORY to identify any potential contraindications to the GXT. (See Appendix F)

d. Identify any medications, from the HEALTH & LIFESTYLES HISTORY form which may influence the GXT.

e. Insure that subject has signed an Informed Consent form
Discuss with the subject and witness as necessary.

f. Insure that physician has signed the PRE-EXERCISE SCREENING DATA (Green Sheet) (see Appendix F). All men 40 years old and older **and** all women 50 years old and older must see a physician before performing a GXT.

g. Insure physician has filled in resting ECG impression on the Green Sheet

h. Review these ECG's for any possible pre-test abnormalities which may be contraindications to exercise.

I. Fill out appropriate spaces on the Yellow Sheet (see Appendix F) and calculate subject's Predicted Max HR (220- age) and 85% Max HR and write it on the Yellow Sheet.

Treadmill Test

1. Prep your client for a supine 12-lead ECG and attach lead wires
2. Enter name, date of test, test protocol, pertinent medical history, and pertinent medication information on yellow sheet
3. Press F1 on keyboard, enter patient name, press ENTER key, enter physician name, press F1 to exit patient data entry screen
4. Take supine BP, Press F3 on keyboard and enter supine BP, press ENTER to exit BP entry screen
5. Press 12 LEAD to obtain a supine ECG and enter supine HR on yellow sheet - label the ECG "supine".

NOTE: During the CHP testing session, the physician, during his examination, will usually take the resting (supine) blood pressure and heart rate and record it at the top of the green sheet. If this is the case, simply transfer this HR and BP information to the yellow sheet and enter that BP on the keyboard. If this HR and BP information is not on the green sheet, you will need to get the data yourself.

6. Calculate the predicted max HR and 85% predicted max HR and record it in on the yellow sheet.
7. Fill in the appropriate stage times, workloads, etc. for the protocol that you will be using during the test
8. Have the client straddle the treadmill belt, obtain pre-exercise BP, and enter it on the yellow sheet
9. Press 12 LEAD to obtain pre-exercise ECG and heart rate; enter the data on the yellow sheet
10. Explain the testing procedures to your client.

NOTE: Remember, the clients are not as familiar with exercise testing as you are and this may be somewhat of a disconcerting experience for them.

11. Make sure desired protocol is selected, Push START BELT, have the client walk until comfortable, push START EXERCISE.
12. At 2:15 into each stage, take BP and record on keyboard
13. Record BP, HR, and RPE for each stage in the "Exercise Data" section of the yellow sheet.

14. When the client can no longer sustain exercise, press STOP EXERCISE, immediately take BP (this will be IPE BP)
15. Record this IPE BP and the associated HR in the first slots in the "Recovery Data" section of the yellow sheet
16. Ask the subject why they stopped the test and record it in the "Maximal Exercise Data" section of the yellow sheet. Record exercise time.
17. Find the highest HR and systolic BP, record that HR and BP (both sys. and dias.) as Peak HR and Peak BP on yellow sheet.
18. Allow the subject to cool down for 4 minutes, taking a BP near the end of each 2 minute recovery stage
19. Record recovery BP on keyboard and recovery HR and BP on yellow sheet
20. At the end of 4 minutes and recovery, stop the belt, push RESET on the ECG machine and disconnect lead wires from the subject.

NOTE: During an actual CHP testing session, the cardiologist on duty may give instructions different than those listed above. If so, comply with these instruction without question. Also some cardiologist prefer including a 1:00 minute recovery BP and ECG in the recovery protocol. This being the case, the ECG machine automatically records a one minute recovery strip. If the cardiologist so desires, record a BP to go along with this strip.

21. Give subject's folder to Physician for review and signature on the Green Sheet.
22. Write your names at the bottom of the Yellow Sheet as ECG Technician and BP Technician. Hand folder to subject and send them to the next station.
23. **If the GXT was positive, have the client talk to the testing coordinator, or the cardiologist. DO NOT have them hydrostatically weighed.**

BICYCLE TEST

1. Have the testing coordinator construct a bicycle protocol.
2. Place a monarch ergometer near an ECG machine (on the treadmill belt works well).
3. Complete preparations and steps 1 through 7 of the instructions for the treadmill test given previously.
4. Select "MANUAL" from the ECG protocol selection button by continually pushing the "select protocol" button until "MANUAL" appears.
5. Adjust cycle seat so that during the extension part of the pedal stroke the knee is about 160^{N} - 170^{N} (knee slightly bent).
6. Instruct the client to pedal at the RPM for your protocol.
7. When the client feels comfortable and is able to maintain the proper RPM, push START EXERCISE button on the ECG machine and increase the tension on the belt to the first stage resistance by turning blue knob below handlebars clockwise.
8. 45 seconds before the end of each stage of the protocol, take a BP and enter it on the keyboard, ask for RPE.
9. 10 seconds before the end of each stage, ask the client to turn loose of the handlebars and manually obtain 12-Lead ECG.
10. Increase the tension to the next stage resistance then record HR, BP, and RPE data for the previous stage on yellow sheet.
11. When the client can no longer maintain the necessary RPM for a particular stage, push STOP EXERCISE.
12. Immediately reduce the tension on the belt to about 1kg and instruct the client to keep pedaling, take IPE BP.
13. Record IPE HR and BP on yellow sheet.
14. Proceed with the cool down and data collection procedures as outlined in steps 16 through 20 in treadmill protocol.

TYPICAL BIKE PROTOCOL

Time	Speed	Load
0 - 2	60 rpm	0.5 kp
2 - 4	"	1.0
4 - 6	"	1.5
6 - 8	"	2.0
8 - 10	"	2.5
10 - 12	"	3.0
12 - 14	"	3.5
14 - 16	"	4.0
16 - 18	"	4.5
18 - 20	"	5.0

Rarely will anyone go past a load of 5.0, but if so, just continue to increase the load .5 kp with each stage.

IMPORTANT EXERCISE TESTING GUIDELINES

1. Do not allow the subject to hold onto the handrails at any time except:
   a. during the early warm-up phase when the subject is just learning to walk on the treadmill.
   b. in the event the subject cannot maintain balance.

   Holding on to the handrails will significantly affect the maximum oxygen consumption estimate taken from time on treadmill.

2. Explain the GXT procedure to the client in a slow detailed manner.
   a. Read the explanation of perceived exertion (see Appendix I).
   b. Explain how they should interpret the perceived exertion chart (see Appendix I). i.e. 6 = just standing on the treadmill.
   c. You will be asking them to give you a number from the chart at the end of each stage or more often if the subject is nearing max.

3. Continually monitor subject while they are exercising.
   a. Ask how they are feeling throughout the test. Maintain verbal and sight contact with subject at all times.
   b. As they near MAX, ask more frequently if they think they can last another minute or 30seconds etc.
   c. Remind them to say "STOP" or give the "thumbs down" signal when they want to stop. **Make sure they do not try to jump-straddle the belt when they reach fatigue.**
   d. If subject has problems during the test, i.e. dizziness, drop in BP, etc., help them off the treadmill, have them lie down, and elevate their feet.
   e. If an emergency should arise, follow the EMERGENCY PROCEDURES outlined in this manual.

4. It may be difficult or impossible to accurately hear the BP sounds during high intensity exercise. If you are not sure of a measurement, quickly attempt to take another. By all means, DO NOT report a BP if you cannot hear the sounds sufficiently to be accurate. Report this difficult to the testing coordinator immediately.
5. Be ready to support the subject as they reach MAX by placing your arm behind them or by grasping their arm. If possible, have another TECH stand at the end of the treadmill if it appears added assistance may be required.

Policy for notifying individuals with positive stress test results.

All individuals undergoing a GXT during CHP testing sessions will visit with the cardiologist regarding their results immediately following their test. The physician will discuss test results and recommend further testing if warranted. If positive, a copy of the test results will be sent with the individual, including the cardiologist on duty's interpretation. A follow up letter further emphasizing the importance of further testing will be sent to ALL individuals with positive tests within 48 hours.

SAFETY AND EMERGENCY GUIDELINES FOR GRADED EXERCISE TESTING PROGRAM

Physician Supervision

As a policy, contract client testing at the Applied Exercise Science Lab at Texas A&M University will be conducted in accordance with the American College of Sports Medicine Guidelines. These guidelines, along with previously established laboratory regulations, provide for the following:

Clients who may be tested without a physician present

1. Men $\leq$ 40 years of age who have no more than 1 major heart disease risk factor and no known symptoms for heart disease as defined by ACSM guidelines.

2. Women $\leq$ 50 years of age who have no more than 1 major heart disease risk factor and no known symptoms for heart disease as defined by ACSM guidelines.

Clients with whom it is suggested that a physician be present during testing

1. All men over the age of 45.

2. All women over the age of 55.

3. All individuals who have more than one major heart disease risk factor or who have symptoms suggestive of heart disease.

Maintenance of Crash Cart and Emergency Equipment

In accordance with established American Heart Association standards, the Applied Exercise Science Lab maintains a cardiac emergency crash cart, which includes a defibrillator, airway aspirator, I.V. setup materials, and cardiac drugs. These items are inspected (and, in the case of the defibrillator, tested) before the start of each testing session. The defibrillator is powered up and tested 3 times at 150 joules, 300 joules and 360 joules, while plugged in to the wall outlet and while running on the internal battery. A record of the drugs, their expiration dates, and associated supplies is kept in checklist form. Records of defibrillator tests are also maintained. See Appendix F for examples of these forms.

CARDIAC EMERGENCY PROTOCOL

In the event of a cardiac emergency during a graded exercise test, the procedures to be used in relationship to the personnel, and to the degree of medical supervision present, the methods of BLS and ACLS are outlined. Emergency treatment will be immediately instituted by those qualified personnel present. Such treatment will consist of basic Cardiopulmonary Resuscitation and Advanced Cardiac Life Support.

A mock emergency drill be held once every semester in conjunction with campus emergency medical personnel. During this drill, **all testing personnel will participate in review and practice of current CPR techniques.** The testing supervisor will supervise this drill and document the event for future reference.

Procedure

The following is an outline of the performance of cardiopulmonary resuscitation in the event of a cardiac or pulmonary emergency.

1. The first staff person witnessing the event will assist the patient and call for help initiating the arrest sequence of the American Heart Association. The arrest sequence of the American Heart Association (10/95) is as follows:

1. Determine unresponsiveness (Shake and shout")

2. Activate EMS (Call 911), and give the following information:

My name is _____.
I am located at the Netum Steed Applied Exercise Science Laboratory, which is south of Kyle field off of Wellborn road.
There is a cardiac emergency.
My phone number is 845-3997.

Remember, the victim whose circulation and breathing have been interrupted for less than four minutes has an excellent chance for full recovery if CPR is administered rapidly and followed by ACLS in the next four minutes. Therefore, early 911 access is crucial to the survival of the victim. Finally, the caller should hang up only after being told to do so by the EMS dispatcher.

3. Open airway using the head tilt/chin lift maneuver

4. Look, listen, and feel for breathing for 5 seconds

5. If the patient is not breathing, give two long breaths

6. Feel for the carotid pulse for 5 to 10 seconds

7. If no pulse, locate correct hand and body position

8. Begin compressions/ventilations at the correct rate and ratio:
   a. One-person: 15/2 at 80 to 100 compressions per minute
   b. Two-person: 5/1 at 80 to 100 compressions per minute

9. After one minute (4 cycles of one-person or 20 cycles of two-person), stop and assess patient for possible return of pulse

2. The first staff person will continue CPR until relieved by a qualified staff person, the testing supervisor or the attending physician.

3. A laboratory staff person will be responsible to ensure that, if an attending physician is present, he or she is notified of the event.

4. A laboratory staff person will bring the emergency cart to the side of the victim, turn the defibrillator on, place jelly on the paddles and hand them to the individual at the side of the victim for a quick-look evaluation of the cardiac rhythm. The quick-look paddles may not be necessary if the patient is already hooked up to the Quinton 12 lead ECG or a telemetric device. An ECG strip of the arrhythmia noted using the quick-look paddles will be obtained. Leads and electrodes will be attached, if not already in place.

6. A laboratory staff person will assist the attending physician in any way as directed by the attending physician in accordance with Basic Life Support and Advanced Cardiac Life Support.

7. Appropriate life support means will be maintained until the patient is successfully transported via ambulance to the nearest emergency room.

8. Transportation will be made under the direct supervision of the medical personnel present. Upon arrival at the emergency room the patient will be discharged to the physician-in-charge and/or the patient's private physician.

9. Either the emergency room attending physician and/or the testing supervisor will notify the patient's private physician of the medical emergency after the patient has been transferred to the emergency room. It will be the duty of the private physician to notify the family.

10. The individual-in-charge (attending physician and/or testing supervisor) will attend the patient until relieved of that responsibility by the emergency room physician.

ANCILLARY MEASURES:

1. The staff person directed to activate the EMS system will be responsible for directing the emergency personnel to the site of the event.

2. In the event of an emergency an available staff person will take on the responsibility as recorder of event activities to include: time of the event; heart rates and blood pressures; the number of defibrillation and joules; and medications utilized and dosages.

3. In the case of an emergency, a designated staff person will escort all clients out of the testing area, and will reassure all clients.

4. The testing supervisor will be responsible for unlocking the south door of the laboratory prior to testing, which is the door that will be accessed by emergency personnel.

5. An Incident Report will be filled out by the individual-in-charge at the time of the emergency and forwarded to the lab director. Witnesses will be interviewed and asked for a statement of what they saw as well as their names, addresses, and phone numbers.

6. An inventory of all supplies will be taken and all supplies replenished following emergency use.

7. Following any event where clients were in need of emergency care:

    a. the entire staff will review and discuss the incident.
    b. a critique will be formed and conclusions drawn.
    c. if necessary, alterations will be made to existing emergency procedures.

PHLEBOTOMY

POLICY:

It is the policy of the Applied Exercise Science Lab to utilize appropriate precautions to minimize the risk of disease transmission to patients and staff by adhering to the Center for Disease Control Guidelines (MMWR, July, 1988, vol. 37, #24), and by complying with the OSHA Federal Register (Dec. 1991, 29CRF1910.1030).

RESPONSIBILITY:

1. It will be the responsibility of the Infection Control Coordinator to provide current information concerning Universal Precautions and disease transmission for distribution to new employees at orientation. It well be his/her responsibility to this policy for each new employee. This policy will be part of the Exposure Control Plan and overall Infection Control Packet.

2. It will be the responsibility of each employee having completed the Universal segment of orientation to comply with this policy. The employee's compliance will be understood by their signature on the Employee Safety/Infection Control/Risk Management Orientation Signature Sheet.

3. It will be the responsibility of the Human Resources office to schedule time for presentation of this subject at regularly scheduled orientation sessions.

4. It will be the responsibility of the Human Resources office to maintain the Employee Safety/Infection Control/Risk Management Orientation signature sheet.

5. It is the responsibility of all laboratory personnel to be familiar with the guidelines of this policy and to utilize the guidelines in their daily activities.

6. It is the responsibility of the department heads/managers to see that her/his employees adhere to these guidelines.

7. Violations of the guidelines listed will be considered violation of laboratory policy and may result in appropriate disciplinary action.

Background:

A. The rising incidence of HIV (human immunodeficiency virus), HBV (Hepatitis B virus), and other blood borne pathogens increased the risk that health-care workers (HCW's) would be exposed to blood and/or bloody body substances from patients infected with these diseases, especially when blood and body fluid precautions were not being followed for all patients. (Note-Universal Precautions were first adopted here in 1987)

B. Because of this risk, **All** patients are to be considered potentially infectious and precautions are to be followed in **All** instances of patient contact deemed appropriate.

   1. Blood, vaginal secretions and semen are known sources for potential exposure to HBV and/or HIV.
   2. CSF (cerebral spinal fluid), synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, saliva in dental/oral procedures, and any body fluid visibly contaminated or suspected of being contaminated with blood, are also possible sources for blood borne pathogens.

C. Since medical history and examination cannot reliably identify all persons infected with HBV, HIV, and/or other blood borne pathogens, and since laboratory test results are not readily available at the time of admission, precautions against exposure to blood/bloody body substances and other potentially infections materials, from **All** patients are to be consistently used.

D. These precautions will not only help to protect the HCW from blood borne pathogens, but will also help to prevent exposure to other potentially infections materials (OPIM's) as well.

PROCEDURE:

The Infection Control Coordinator will provide current information concerning Universal Precautions. This will include background information, procedure for implementing Universal Precautions, precautions for invasive procedures, precautions for laboratories, environmental considerations for blood borne pathogen disease transmission, and environmental concerns.

A. Routine precautions: All health-care workers are to routinely use appropriate barrier precautions and/or personal protective equipment (PPE's) to minimize the risk of skin and mucous membrane exposure when contact with blood/bloody body fluids, or other potentially infectious materials (OPIM), from **any** patient is anticipated.

B. Because Universal Precautions pertain mainly to instances were potential exposure to blood and/or bloody body substances and to the fluids listed in II.B.2 above), blood and body fluid precautions will still need to be utilized as necessary.

C. Specific Guidelines:

1. Gloves are to be worn when: (List not to be considered inclusive, other situations may apply)
    a. Touching any blood/bloody body fluid, or other potentially infectious material (OPIM), from **ALL** patients.
    b. Handling items that may be contaminated with blood/bloody body substances, or other potentially infectious materials (OPIM).
    c. Performing venipuncture and other vascular access procedures.
2. Gloves are to be changed with each patient contact.
3. **The use of gloves does not take the place of hand washing! Hands are to be washed before gloving and after gloves are removed**.
4. Masks and protective eyewear are to be worn during procedures likely to generate droplets of blood/bloody body fluids, or other potentially infectious materials (OPIM), to minimize the risk of exposure to mucous membranes of the eye, mouth and nose. (Ex.-patient intubation, nasogastric tube insertion)
5. Impervious gowns, aprons or other outer coverings, are to be worn during procedures that are likely to generate splashed blood/bloody body fluids, or other potentially infections materials (OPIM).

6. All health-care workers (HCW) are to take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices before, during and after procedures. Precautions should be taken when cleaning/decontaminating used instruments and during disposal of used needles.

   a. To prevent needle stick injuries:

      I. **DO NOT RECAP, PURPOSEFULLY BEND OR BREAK, OR REMOVE USED NEEDLES FROM THE SYRINGE**.

      ii. After use, disposable sharps, needles and syringes are to be placed in a puncture resistant, leak proof, biohazard labeled, container for disposal. (See policy on Needle/Sharps Disposal)

      iii. Non-disposable sharps and instruments are to be placed in a puncture resistant, leak proof, biohazard labeled, container utilizing forceps, or other mechanical devices, (**NEVER USE YOUR HANDS, GLOVED OR NOT!**). **Sharps and medical waste will always be placed in the appropriately labeled containers.** When these containers are full, they will be picked up and replaced.

D. Although saliva is not normally a vector in the transmission of HIV, dental or oral procedure can potential bloody exposure, and other infectious materials (OPIM) may be present. Ambu or other resuscitation bags, mouthpieces, and other ventilation devices should be readily available in all patient care areas, to minimize the need for mouth-to-mouth resuscitation.

E. Health-care workers who have exudative lesions or weeping dermatitis are to refrain from direct patient care and from handling patient care equipment until the condition resolves.

F. Pregnant health-care workers are <u>NOT</u> at a greater risk for contracting HIV infection than other HCW's. However, if a pregnant HCW does develop HIV infection, the infant is at risk of infection through perinatal transmission. Because of this risk, the CDC recommends that pregnant HCW's be especially familiar with and strictly adhere to precautions to minimize the risk of HIV exposure.

Precautions for Invasive Procedures:

A. Definition: Invasive procedures are defined as surgical entry into tissues, cavities, or organs, or as the repair of major traumatic injuries-

1. In an operating or delivery room, emergency department, or outpatient setting, including physician's offices.
2. Cardiac catheterization and angiographic procedures.
3. Vaginal or cesarean delivery or other invasive obstetric procedure.
4. The manipulation, cutting or removal of any oral or perioral tissues, including tooth structure, during which bleeding occurs or the potential for bleeding exists.

B. The universal precautions listed previously are to be combined with the following guidelines as the minimum precautions to be instituted for **all** such invasive procedures.

1. All HCW's who participate in invasive procedures **must** routinely use appropriate barrier precautions/personal protective equipment (eg., gloves, face shields, masks, goggles etc...,) to prevent skin and mucous membrane contact with body substances from a patient.
    a. Gloves and masks/face shields are to be worn in all invasive procedures when the generation of bloody droplets is likely.
    b. Protective eyewear is to be worn for procedures that commonly result in the generation of droplets, splashing of body substances, and/or the generation of bloody bone chips.
    c. Impervious gowns or aprons are to be worn in invasive procedures that are likely to result in splashing of any blood/bloody body substance, or other potentially infectious materials (OPIM).

C. If a glove is torn, a needle stick or other injury occurs, the glove is to be removed and replaced with a new one, as soon as patient permits. The needle or instrument involved in the incident is to be removed from the sterile field, if applicable.

Precautions for Laboratories:

A. Blood/bloody body substances, and other potentially infectious materials (OPIM), from **all** patients are to be considered contaminated.

B. In addition tot he universal precautions and invasive procedures listed previously, the following precautions are to be followed:

1. All specimens of blood/bloody body substances, or other potentially infectious materials, are to be placed in a leak proof, puncture resistant, biohazard labeled container prior to, and during transport. (See policy on Transportation of Specimens)
2. Care should be taken when collecting specimens to avoid contamination of the outside of the container and the lab slip.
3. All persons processing blood/bloody body fluids and other infectious materials (OPIM), are to wear gloves. Barrier shields, masks, or face shields are to be used if mucous membrane contact is anticipated. Gloves are to be changed, hands washed, and work surfaces cleaned after completion of the specimen processing.
4. For routine procedures such as histologic, pathologic studies, or microbiologic culturing, a safety cabinet is not necessary. Biologic safety cabinets (class I or II) are to be used whenever procedures are conducted that have a high potential for generating droplets.
5. Mechanical pipetting is to be used at all times.
6. Use of needles and syringes is to be limited to situations in which there is no alternative. The guidelines for preventing needle stick injuries are to be followed (see section III.A.4)
7. Laboratory work surface areas are to be decontaminated with a hospital approved cleaner after a spill of blood/bloody body fluids or other infectious materials (OPIM), and at the end of a normal workday (every 8 hours).
8. Contaminated material in laboratory tests are to be decontaminated before reprocessing, or be placed in biohazard containers for incineration, or ground and flushed into sewer.

9. Equipment is to be decontaminated and cleaned prior to servicing or repair. If it can not be **completely** decontaminated, it is to be **clearly** labeled with a biohazard label indicating which part(s) remain contaminated. All persons who may come in contact with the contaminated part of this equipment are to be in serviced to the above label, so that they will be able to avoid exposure.
10. All laboratory personnel are to wash their hands with the approved hospital cleanser (eg., Hibiclens) and are to remove all personal protective equipment prior to leaving the "contaminated" laboratory area.

Environmental Consideration

Due to the fragility of the HIV virus, environmental transmission would be remote. HBV however, is quite sturdy and has been known to exist for several hours in dried fluids, retaining it's infectious capabilities. Other potentially infectious diseases may also be environmentally transmitted, therefore the following precautions are to be utilized on **all** patients:

A. Sterilization and Disinfection:
   1. Standard sterilization and disinfection procedures for patient care equipment currently in use are to used at ll times (see Nursing Service P&P's "Equipment, Storage of in Patient Care Areas" and "Instruments, Returning Soiled Instruments to Decontam").
   2. When medical devices are contaminated with blood/bloody body substances, or other infectious materials (OPIM), the device is to be decontaminated (cleaned) of visible contamination prior to returning to CSS for processing, to their usual storage area, or sent for repairs. (See V.B.9)
      a. Gloves and protective eyewear are to be worn.
      b. Impervious gowns or aprons are to be worn if splashing is likely.
      c. If device is sharp or may puncture skin, mechanical devices are to be used to hold or clean it, **never use your hands!!!** (ex. tongs, forceps)

B. Environmental Surfaces
   1. Equipment in patient care areas are to be cleaned on a regular basis, when soiling or spill occur, and when a patient is discharged. Regular daily cleaning and discharge. Regular daily cleaning and discharge cleaning, is the responsibility of environmental services. (Ex. bedside tables, floors beds, sinks, bathrooms)

2. Cleaning and decontaminating spills of blood or other infectious materials:
    a. Gloves are to be worn during the cleaning of all spills and discarded after use. If spill contains sharps or broken glass, appropriate mechanical devices are to be used (forceps, tongs, broom and dust pan). **Never use your hands to pick up contaminated sharps or broken glass !!!**
    b. Chemical germicides that are approved for use as hospital disinfectants and are tuberculocidal when used as directed can be used to decontaminate spills of blood/bloody body fluids or other infectious materials.
    c. Cover the spill with paper towels. Flood the paper towels with a liquid germicidal. Allow to sit for 10 minutes. Remove the soaked towels and discard into biohazard container. Wipe the area with clean paper towels until all moisture is absorbed. Flood area again with fresh germicidal and wipe up with fresh paper towels. Discard all paper towels, gloves and any contaminated PPE's into appropriately labeled biohazard container. (Note-if unsure of how to clean any spill, contact environmental services for instructions)

C. Laundry:
1. Hygienic and common sense storage and processing of clean and soiled linen is recommended.
    a. Soiled item is to be handled as little as possible and with minimum agitation.
    b. All soiled linen is to be bagged at the location where it was used in the color coded biohazard bags.
    c. Linen soiled with blood or bloody body substances is to be placed in bags which prevent leaking.
2. Routine double bagging is not necessary nor is it recommended.

D. Regulated Waste (Infectious): Personal Protective Equipment is required for disposal.
1. Special precautions are needed when the potential of causing infection during the handling and disposal is possible (regulated), and where special precautions seem prudent.
    a. Microbiology laboratory waste

b. Pathology waste
c. Blood specimen or products
d. Certain isolation waste

2. Waste generated in patient rooms, even when containing blood, exudate and/or secretions, usually is not State Regulated for disposal. If it is dripping or saturated, the item should then be treated as regulated waste, and disposed of as follows:
   a. Place in the nearest trash receptacle (brown bag). Make sure the bag is not going to leak, it may need to be double bagged.
   b. Secure the top, and transport to the red bag in the soiled utility for disposal.
3. Bulk blood (100cc or more), suctioned fluid, excretion, and secretions may be carefully poured into sewage and flushed.

Why You should be Vaccinated for Hepatitis B

Incidence/Deaths

- There are 300,000 new cases in the U.S. every year.
- 1.2 million Americans are chronic carriers capable of transmitting hepatitis B to others -- that's 1 in 200 people.
- Each year, another 30,000 people join the growing pool of chronic infectious carriers in the U.S.
- About 5,000 Americans die annually from hepatitis B-related illnesses such as cirrhosis and liver cancer -- 14 deaths every day.

Occupational Dangers

- Although the risk of infection for healthcare workers is up to 10 times greater that of the general population, less than half of healthcare workers have been vaccinated.
- More than 12,000 healthcare workers are infected each year and 300 die -- five every week-- from hepatitis B-related illnesses.
- Current recommendations by the U.S. Centers for Disease Control (CDC) urge vaccination for all healthcare workers.

- The U.S. Occupational Safety & Health Administration (OSHA) issued its new standard -- covering more that 5.3 million healthcare workers -- on December 6, 1991, requiring hospitals to provide the hepatitis B vaccine to their at-risk employees.

Modes of Transmission

- Contact with infected blood and other body fluids
- Sexual intercourse or other sexual activities
- Mother-to-child transmission during birth

Disease Symptoms/Consequences

- Fifty percent of those infected suffer symptoms ranging from mild fever and nausea to jaundice, severe abdominal pain and liver failure.
- The other 50 percent suffer no symptoms, but can unknowingly transmit the disease to others and develop chronic liver disease.
- Up to 10 percent of those infected, unable to clear the virus from their liver cells, become chronic hepatitis B carriers, increasing their risk of developing liver cancer or cirrhosis.
- Approximately 1 to 2 percent of newly infected persons will develop fulminate hepatitis, a severe disease that rapidly destroys the liver and is almost always fatal.
- There is not cure for chronic hepatitis B.

Prevention by Vaccine

- Hepatitis B is preventable by vaccine.
- Genetically engineered vaccines are more that 95 percent effective, providing immunity in at least 9 out of 10 persons vaccinated.
- Current hepatitis B vaccines use no blood or blood products in their manufacture and pose no risk of acquiring hepatitis B or other diseases.

EMPLOYEE HEPATITIS B VACCINE DECLINATION

Facility:

Department:

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with hepatitis B vaccine at no charge to myself. However, I decline hepatitis B vaccination at this time.

I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

_____ SS#:

Employee's Name - Please Print

_____ Date:

Employee's Signature

Witness' Name - Please Print

_____ Date:

Witness' Signature

Hepatitis B Vaccination Program

A. Is available at no cost to employees whose job performance places them at risk for exposure to blood or bloody body substances. (Categories I and II) It is available at cost to employees whose job performance does not place them at such risk. (Category III)

B. Is offered on a monthly basis with post vaccination lab screening to assess immune status.

C. The information regarding Hepatitis B vaccination, or the actual vaccination, is available to all non licensed employees prior tot he first assigned workday whose job description places them at risk of occupational exposure to blood borne pathogens. All other new hires and transfers are able to receive the vaccine within 10 working days of their initial assignment. The vaccine is also available during orientation.

D. Hepatitis B vaccination is STRONGLY encouraged by this facility and new information regarding Hepatitis B disease and this vaccine, are routinely shared with all employees of this facility to increase awareness of this issue, and encourage vaccination compliance.

E. Employees whose job description places them in the at risk category, must sign the Declination of Vaccination Statement. (Categories I and II) they may receive the vaccine at a later time should their decision to not be vaccinated change.

PULMONARY FUNCTION TESTING

1. Pulmonary function testing will be carried out using the Medical Graphics 1070 automated spirometry system of the Collins water tank system.

2. **The hoses leading to the pneumotach or water tank will be replaced after each use (between subjects).** After testing, all hoses will be washed in soap solution, rinsed, and hung to dry on a hose rack.

3. **The cardboard mouthpiece attached to the airflow hose will be replaced after each use (between subjects)**, and the used mouthpiece will be discarded.

APPENDIX A

Progression Charts

for

Beginning Aerobics

Intermediate Aerobics

Advanced Aerobics

Step Aerobics

Water Aerobics

Walking/Jogging

Weight Training and Cardiovascular Conditioning

Beginning Aerobics

Goal: Warm -up & Stretch - 5-10 mins.
Low-impact Aerobics - 35-40 mins.
Calisthenics - 10-15 mins.
Cool down & Stretch - 5 -10 mins.
Intensity - 75% of Max Heart Rate
MONDAY----------WEDNESDAY---------FRIDAY

Week 1
10-15 mins. Warm-up/Stretch
20 mins. Aerobics (60%)
20 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 2
10 mins. Warm-up/Stretch
20 mins. Aerobics (60%)
20 mins. Calisthenics
5-10 mins. Cool down

Week 3
10 mins. Warm-up/Stretch
25 mins. Aerobics (65%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 4
10 mins. Warm-up/Stretch
25 mins. Aerobics (65%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 5
10 mins. Warm-up/Stretch
30 mins. Aerobics (70%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 6
10 mins. Warm-up/Stretch
30 mins. Aerobics (70%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 7
5-10 mins. Warm-up/Stretch
30-35 mins. Aerobics (70%)
15-20 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 8
5-10 mins. Warm-up/Stretch
30-35 mins. Aerobics (75%)
15-20 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 9-16
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (75%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Intermediate Aerobics

Goal: Warm-up & Stretch - 5-10 mins.
Low/High Impact Aerobics - 35-40 mins.
Calisthenics - 10-15 mins.
Cool down & Stretch - 5-10 mins.
Intensity - 80% of Max Heart Rate
MONDAY----------WEDNESDAY---------FRIDAY

Week 1
10 mins. Warm-up/Stretch
30 mins. Aerobics (65%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 2
5 mins. Warm-up/Stretch
30 mins. Aerobics (65%)
20 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 3
5 mins. Warm-up/Stretch
35 mins. Aerobics (70%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 4
5 mins. Warm-up/Stretch
35 mins. Aerobics (70%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 5
5 mins. Warm-up/Stretch
35 mins. Aerobics (75%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 6
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (75%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 7
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 8
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 9-16
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Advanced Aerobics

Goal: Warm-up & Stretch - 5 mins.
Low/High Impact Aerobics - 35-40 mins.
Calisthenics - 10-15 mins.
Cool down & Stretch - 5-10 mins.
Intensity - 80% of Max Heart Rate
MONDAY----------WEDNESDAY---------FRIDAY

Week 1
5 mins. Warm-up/Stretch
35 mins. Aerobics (70%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 2
5 mins. Warm-up/Stretch
35 mins. Aerobics (70%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 3
5 mins. Warm-up/Stretch
35-40 mins. Aerobics (75%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 4
5 mins. Warm-up/Stretch
35-40 mins. Aerobics (75%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 5
5 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 6
5 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 7
5 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 8
5 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 9-16
5 mins. Warm-up/Stretch
35-40 mins. Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Step Aerobics

Goal: Warm-up & Stretch - 5 mins.
Step-box Aerobics - 35-40 mins.
Calisthenics - 10-15 mins.
Cool down & Stretch - 5-10 mins.
Intensity - 80% of Max Heart Rate
MONDAY----------WEDNESDAY----------FRIDAY

Week 1
10 mins. Warm-up/Stretch
30 mins. Step-box Aerobics (65%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 2
5 mins. Warm-up/Stretch
35 mins. Step-box Aerobics (70%)
15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 3
5 mins. Warm-up/Stretch
35-40 mins. Step-box Aerobics (75%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 4
5 mins. Warm-up/Stretch
35-40 mins. Step-box Aerobics (75%)
10-15 mins. Calisthenics
5-10 mins. Cool Down/Stretch

Week 5
5 mins. Warm-up/Stretch
35-40 mins. Step-box Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 6
5 mins. Warm-up/Stretch
35-40 mins. Step-box Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 7
5 mins. Warm-up/Stretch
35-40 mins. Step-box Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 8
5 mins. Warm-up/Stretch
35-40 mins. Step-box Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Week 9-16
5 mins. Warm-up/Stretch
35-40 mins. Step-box Aerobics (80%)
10-15 mins. Calisthenics
5-10 mins. Cool down/Stretch

Water Aerobics

GOAL: Warm-up & Stretch - 5-10 mins.
Low/High Impact Aerobics - 35-40 mins.
Cool down - 5-10 mins.
*Intensity - Work at own pace within 60%-80% of Max Heart Rate

***Note: If you have been exercising consistently, you may want to begin at a higher intensity.**

MONDAY----------WEDNESDAY---------FRIDAY

Week 1
10 mins. Warm-up/Stretch
25 mins. Aerobics (60%)
15 mins. Water Calisthenics
10 mins. Cool down/Stretch

Week 2
10 mins. Warm-up/Stretch
25 mins. Aerobics (65%)
15 mins. Water Calisthenics
10 mins. Cool down/Stretch

Week 3
10 mins. Warm-up/Stretch
30 mins. Aerobics (65%)
10 mins. Water Calisthenics
10 mins. Cool down/Stretch

Week 4
10 mins. Warm-up/Stretch
30 mins. Aerobics (65%)
10 mins. Water Calisthenics
10 mins. Cool Down/Stretch

Week 5
5-10 mins. Warm-up/Stretch
35 mins. Aerobics (70%)_
10 mins. Water Calisthenics
5-10 mins. Cool down/Stretch

Week 6
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (70%)
10 mins. Water Calisthenics
5-10 mins. Cool down/Stretch

Week 7
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (70%)
10-15 mins. Water Calisthenics
5 mins. Cool down/Stretch

Week 8
5-10 mins. Warm-up/Stretch
35-40 mins. Aerobics (70%)
10-15 mins. Water Calisthenics
5 mins. Cool down/Stretch

Week 9-16
5-10 mins. Warm-up/stretch
35-40 mins. Aerobics (75%)
10-15 mins. Water Calisthenics
5 mins. Cool down/Stretch

Walking/Jogging

Goal: Warm-up/Stretch (Include push-ups & sit-ups) - 5-10 mins.
*Walk/Jog at own pace within 60%-80% of Max Heart Rate - 40-45 mins.
Cool Down - 1-2 Laps
Monitor Heart Rate Half-time, End, Recovery

***NOTE: If you have been exercising consistently, you may want to begin at a higher intensity than suggested.**

MONDAY----------WEDNESDAY---------FRIDAY

Week 1 10-15 mins. Warm-up/Stretch
30 mins. Walk/Jog (60%)
1-2 Laps Cool down/Stretch

Week 2 5-10 mins. Warm-up/Stretch
35 mins. Walk/Jog (60%)
1-2 Laps Cool down/Stretch

Week 3 5-10 mins. Warm-up/Stretch
35 mins. Walk/Jog (65%)
1-2 Laps Cool down/Stretch

Week 4 5-10 mins. Warm-up/Stretch
35 mins. Walk/Jog (65%)
1-2 Laps Cool down/Stretch

Week 5 5-10 mins. Warm-up/Stretch
35-40 mins. Walk/Jog (70%)
1-2 Laps Cool down/Stretch

Week 6 5-10 mins. Warm-up/Stretch
35-40 mins. Walk/Jog (70%)
1-2 Laps Cool down/Stretch

Week 7 5-10 mins. Warm-up/Stretch
40-45 mins. Walk/Jog (70%)
1-2 Laps Cool down/Stretch

Week 8 5-10 mins. Warm-up/Stretch
40-45 mins. Walk/Jog (75%)
1-2 Laps Cool down/Stretch

Week 9 5-10 mins. Warm-up/Stretch
40-45 mins. Walk/Jog (75%)
1-2 Laps Cool down/Stretch

Week 10-16 5-10 mins. Warm-up/Stretch
40-45 mins. Walk/Jog (80%)
1-2 Laps Cool down/Stretch

Option: Alternate Walk/Jog with Stair Climbing

Weight Training/Cardiovascular Conditioning

Goal: Warm-up/Stretch (include push-ups & sit-ups here, if not in routine) - 10 mins.
Weight Training - 50 mins., 2 sets each exercise, 10-12 repetitions
Intensity - when you can easily complete last couple of reps, it is time to increase weight

(AND/OR)

Cardiovascular Conditioning - (Bike, Treadmill, Stairmaster, Track) 35-45 MINS., 60%-80% of Max Heart Rate
Cool down/Stretch - 5 mins.

***Note: If you have been exercising consistently, you may want to begin at a higher intensity than suggested.**

--- Weight Training ---

MONDAY----------WEDNESDAY---------FRIDAY

Week 1
10-15 mins. Warm-up/Stretch
30 mins. Weight Training
2 sets each, 8-10 reps - 1 min. rest
50-60% of weight (Large muscle group)
30-40% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 2
10-15 mins. Warm-up/Stretch
30 mins. Weight Training
2 sets each, 8-10 reps - 45 sec. rest
50-60% of weight (Large muscle group)
30-40% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 3
10-15 mins. Warm-up/Stretch
40 mins. Weight Training
2 sets each, 10-12 reps - 45 sec. rest
60-65% of weight (Large muscle group)
35-40% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 4
10-15 mins. Warm-up/Stretch
40 mins. Weight Training
2 sets each, 10-12 reps - 30 sec. rest
60-65% of weight (Large muscle group)
35-40% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 5
10-15 mins. Warm-up/Stretch
40 mins. Weight Training
2 sets each, 10-12 reps - 20 sec. rest
60-65% of weight (Large muscle group)
35-40% of weight (Small muscle group)
5 mins. Cool down/Stretch

MONDAY----------WEDNESDAY---------FRIDAY

Week 6
10-15 mins. Warm-up/Stretch
45 mins. Weight Training
2 sets each, 10-12 reps - 20 sec. rest
60-65% of weight (Large muscle group)
35-40% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 7
10-15 mins. Warm-up/Stretch
45 mins. Weight Training
2 sets each, 10-12 reps - 20 sec. rest
65-70% of weight (Large muscle group)
40-45% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 8
10-15 mins. Warm-up/Stretch
50 mins. Weight Training
2 sets each, 10-12 reps - 20 sec rest
65-70% of weight (Large muscle group)
40-45% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 9
10-15 mins. Warm-up/Stretch
50 mins. Weight Training
2 sets each, 10-12 reps - 20 sec. rest
70-75% of weight (Large muscle group)
45-50% of weight (Small muscle group)
5 mins. Cool down/Stretch

Week 10-16
10-15 mins. Warm-up/Stretch
50 mins. Weight Training
2 sets each, 10-12 reps - 20 sec. rest
70-75% of weight (Large muscle group)
45-50% of weight (Small muscle group)
5 mins. Cool down/Stretch

Remember...When you can easily do the last couple of reps, it is time to increase the weight.

---Cardiovascular Conditioning---

MONDAY----------WEDNESDAY---------FRIDAY

Week 1
10-15 mins. Warm-up
20 mins. Aerobics (60%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 2
10 mins. Warm-up
20 mins. Aerobics (65%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 3
10 mins. Warm-up
25 mins. Aerobics (65%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 4
10 mins. Warm-up
25 mins. Aerobics (65%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 5
10 mins. Warm-up
25 mins. Aerobics (70%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 6
10 mins. Warm-up
25 mins. Aerobics (70%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 7
10 mins. Warm-up
30 mins. Aerobics (70%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 8
10 mins. Warm-up
30 mins. Aerobics (70%)
10-15 mins. Abs & Push-ups
10 mins. Cool down/Stretch

Week 9
10 mins. Warm-up
35 mins. Aerobics (70%)
10 mins. Abs & Push-ups
5 mins. Cool down/Stretch

Week 10-16
10 mins. Warm-up
35-45 mins. Aerobics (75%-80%)
10 mins. Abs & Push-ups
5 mins. Cool down/Stretch

APPENDIX B

RECORD KEEPING FORMS

Client Registration Form and PARQ
Informed Consent Form
Physician Referral Form
Exercise Prescription Worksheet
Client Attendance Sheet
Apprentice Attendance Sheet
FIT*LIFE* Field Testing
Instructor/Class Evaluation
Accident Report Form

FITLIFE Registration Form

Please print and complete the registration form and fitness questionnaire. Mail the registration form and your payment to :

FIT*LIFE* Exercise Program
c/o Steven E. Martin
Dept of Health & Kinesiology
College Station, TX 77843-4243

PLEASE REGISTER ME FOR . . .

9 Basic Member	9 Select Member	9 Adult Fitness
9 Hydrofit Member	9 Faculty	9 Staff
9 Student	9 Community	

NAME: _____
Last First MI

AGE: _____ **Sex:** M / F **SOCIAL SECURITY#**_____

ADDRESS: 9 A&M Campus (preferred) 9 Home 9 Work **PHONE:** (Work)_____
_____ (Home)_____
_____

For payment by credit card:
Name on Credit Card _____ Visa / MC _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ exp date _____

FITNESS QUESTIONNAIRE

Have you ever experienced, or has your doctor ever informed you that you presently have or have had:

	Yes	No	Unsure
1. Heart trouble?	___	___	___
2. Chest pain/tightness that goes away with rest?	___	___	___
3. Dizziness or fainting?	___	___	___
4. High blood pressure?	___	___	___
5. High cholesterol level (above 240 mg/dL)?	___	___	___
6. Musculoskeletal problems that inhibit your exercise?	___	___	___
7. Other problems which would inhibit your performing endurance or resistance exercise?	___	___	___
8. Do you presently smoke?	___	___	
9. Are you a:			
male > 45 years of age?	___	___	
female > 55 years of age?	___	___	

IF YOU ANSWERED "YES" TO ANY OF THE ABOVE QUESTIONS YOU MUST OBTAIN A WRITTEN CLEARANCE FROM YOUR PHYSICIAN BEFORE YOU CAN BEGIN EXERCISE IN THE FIT*LIFE* EXERCISE PROGRAM.

9 **Check here if your physician's referral is on file with FIT*LIFE.***
Please list any medications you are currently taking and the reason. Include medications such as aspirin, etc.

How did you hear about the FIT*LIFE* Exercise Program?

_____ **FIT*LIFE* brochure** _____ **Friend** _____ **Battalion** _____ **Radio/TV** _____ **Internet**_____**Newspaper**
_____ **FIT*LIFE* flyer** _____ **FIT*LIFE* presentation** _____ **Human Resources Newsletter** _____ **Other**

I have completed the registration form and the fitness questionnaire. I agree to obtain a physician's referral if requested by the FITLIFE Exercise Program before I begin exercise. Enclosed is a check OR charge to my credit card $____, the price of the registered membership.

_____ _____
Signature Date

___date ___PR Recommended by staff ___date ___PR Recommended by Coord ___date ___PR Received & Approved

Fit*Life* Exercise Program
Applied Exercise Science Laboratory
Texas A&M University

Informed Consent for Exercise Class Participation

If I am over 45 years old and previously inactive, I have obtained approval of my physician for participation in this exercise program. However, if I am less than 45 years old and/or presently physically active, I hereby affirm that I have no known cardiovascular disease, primary cardiovascular risk factor, or other medical problem which might preclude my participation in an aerobic exercise program or make it in any way dangerous to do so.

The exercise program will follow an exercise prescription which is based on an exercise test or on my present age and overall health status as assessed by a questionnaire. I will be given explicit instructions regarding the amount and kind of regular exercise I should do. My pre-exercise blood pressure will be monitored if required. I will monitor my own pulse rate before, during, and after each exercise session. I understand that there exists the possibility of certain changes occurring during the exercise sessions. These include abnormal blood pressure, fainting, disorders of heart beat, and in extremely rare instances, heart attack and death. (Every effort will be made to minimize them by observations during exercise.)

I realize that the exercise program I am undertaking is designed to place gradually increasing workloads on the heart and circulation and to attempt to improve its function. I know that to be safe and gain expected benefits, I must give priority to regular attendance and adherence to prescribed amounts of intensity, duration, frequency, progression and type of activity.

I further understand that any information which is obtained during optional fitness testing and while I am a participant of the Texas A&M FIT*LIFE* exercise program will be treated as privileged and confidential. It will not be released or revealed to any person without my expressed written consent. The information obtained, however, may be used for statistical analysis or scientific purposes with my right of privacy retained.

I also hereby agree to hold harmless Texas A&M University and all persons associated with the FIT*LIFE* exercise program from any damages or injuries that may result from my participation in this exercise class, regardless of whether negligence on the part of persons associated with the class is involved.

My permission to engage in this exercise program is voluntary. I am free to deny consent if I so desire, both now and at any point in the program. I have read this form and I understand the exercise program in which I will be engaged. I accept the rules and regulations set forth. I consent to participate in the Texas A&M FIT*LIFE* Exercise Program.

Note: This unit of Texas A&M FIT*LIFE* exercise program is designed to serve healthy, low risk individuals only. No treatment or rehabilitation of cardiovascular, pulmonary, metabolic or other diseases in expressed or implied, and participation within this unit by individuals having these or related disorders **is not permitted**.

_____

Signature of Participant Signature of Witness

_____ _____

Print Name Date

Texas A&M University
Physician Referral Form for
Graded Exercise Testing and/or Exercise Program

Participant's Name _____ Address _____
Last First MI Number Street City State Zip

Date of Evaluation ___/___/___ Birthdate ___/___/___

1. Date of last completed physical examination

2. Present physical activity - please check one of the following:
( ) Very active ( ) Limited
( ) Normal ( ) Very limited

3. Risk factors - please check one of the following:
( ) Smoking ( ) Sedentary life (little exercise)
( ) Hypercholesterolemia ( ) Obesity
( ) Family history of heart disease ( ) Non-specific ECG changes
( ) Mild or severe hypertension

4. Contraindications for exercise or exercise testing - please check
( ) Coronary artery disease ( ) Significant ECG abnormalities
( ) Severe hypertension ( ) Chest Pain
( ) Significant cardiac dysrhythmia ( ) Syncope
( ) Significant valvular disease ( ) Significant neurological or orthopedic limitation

Comments

5. Any other pertinent abnormalities that you are aware of
6. 12-lead ECG. (Please attach copy with interpretation) **7.** Resting Blood Pressure ____/_____
( ) Normal ( ) Abnormal

8. Current medications and dosages
9. Indicate if previously performed and enclose copy of report if available.
( ) Graded exercise test ( ) Echocardiogram
( ) Thallium study ( ) Radionuclide ventriculogram
( ) Coronary arteriogram

10. Limitations to exercise
I know of no reason why my patient _____ should not be able to undertake a graded exercise test and/or participate in an exercise program.

Physician's Signature _____ Date

Physicians Name (please print) _____ _____

Address _____

Phone: office (___) _____ emergency (___)

Return to: Dr. Steven E. Martin, Department of Health and Kinesiology, Texas A&M University, College Station, TX 77843-4243 - Phone: 979-845-3997 FAX 979-862-2207

EXERCISE PRESCRIPTION WORKSHEET

Name _____ **Age** _____ **Sex**

FITNESS SELF ASSESSMENT

Description of Exercise Habits	Fitness Category
_____ 1. Do not exercise regularly; sedentary occupation	1
_____ 2. Seldom exercise; somewhat active	2
_____ 3. Exercise at least 2 times/week for at least 20 min./session	3
_____ 4. Exercise at least 3 times/week for at least 30 min./session	4
_____ 5. Exercise at least 4 times/week for at least 40 min./session	5

EXERCISE PRESCRIPTION HEART RATE

A basic exercise prescription consists of three components: the frequency, duration, and intensity of exercise. Your general fitness objective in the FITLIFE Exercise Program will be to exercise at a frequency of 3 times per week progressing to a duration of 30-40 minutes of continuous exercise per session, excluding the warm-up and cool-down. The training intensity is the most important aspect to determine and monitor. We will use the heart rate as an indicator of the training intensity. You can calculate your exercise training intensity as follows:

Maximum Heart Rate (MHR): **MHR =**
Estimated (220 - your age) or measured during GXT (Best)

Resting Heart Rate (RHR): **RHR =**
Count pulse for 60 seconds preferably after awakening in morning or after quiet sitting for 3-4 minutes.

Heart Rate Reserve (HRR): **Calculated MHR - RHR** **HRR =**

TRAINING HEART RATE RANGE (THR):

Fitness category 1 and 2
Lower Limit: **(HRR * .55) + RHR =**
Upper Limit: **(HRR * .70) + RHR =**

Fitness Category 3
Lower Limit: **(HRR * .65) + RHR =**
Upper Limit: **(HRR * .75) + RHR =**

Fitness Category 4 and 5
Lower Limit: **(HRR * .75) + RHR =**
Upper Limit: **(HRR * .85) + RHR =**

NOTE: Assuming no medical problems develop during training, individuals in Fitness Categories 1 through 3 may generally increase their training heart rate range 5% every 3 weeks until they reach the level of Fitness Category 4 and 5 participants. AT NO TIME SHOULD ANYONE SURPASS A TARGET HEART RATE OF 90%

FIT*LIFE* CLIENT ATTENDANCE SHEET

Class_____ Semester & Year_____ Instructor

CLIENT NAME	CLASS DATES																		

APPRENTICE ATTENDANCE SHEET

Class_____ Semester & Year_____ Instructor

APPRENTICE NAME	CLASS DATES																		
APPRENTICE NAME	CLASS DATES																		

FIT*LIFE* TESTING

Participant's name_____ **FIT*LIFE* class**_____

semester_____ **year**_____ **pre**_____ **post**_____

age_____ **sex**_____ **height**_____ **weight**_____

seated blood pressure _____ / _____ **category**_____

step test: **recovery heart rate**_____ **category**_____

body composition (skinfolds):

body fat % _____
category _____

chest _____
axilla _____
tricep _____
subscapular _____
abdomen _____
suprailiac _____
thigh _____

situps: **number performed** _____
category _____

pushups: **number performed** _____
category _____

flexibility: **sit - and - reach score** _____
category _____

FIT*LIFE* Client Evaluation for Aerobic Classes

This questionnaire has been developed to help us evaluate and improve our program. Please take a few minutes to rate your class & instructor, complete the questionnaire, then return it to your instructor. If you wish, make additional comments on the back. Responses are confidential.

	Poor	Fair	Average	Good	Excellent
CLASS ORGANIZATION	1	2	3	4	5
INSTRUCTOR CUING	1	2	3	4	5
INSTRUCTOR VARIETY IN ROUTINE	1	2	3	4	5
MUSIC SELECTION, VARIETY AND VOLUME	1	2	3	4	5
INSTRUCTOR PUNCTUALITY	1	2	3	4	5
INSTRUCTOR APPEARANCE	1	2	3	4	5
INSTRUCTOR KNOWLEDGE CONCERNING EXERCISE & HEALTH	1	2	3	4	5
INSTRUCTOR COMMUNICATION OF SAFETY TIPS AND MODIFICATIONS	1	2	3	4	5
OVERALL RATING OF YOUR CLASS	1	2	3	4	5
OVERALL RATING OF INSTRUCTOR	1	2	3	4	5
YOUR OVERALL SATISFACTION WITH THE CLASS	1	2	3	4	5
OVERALL RATING OF APPRENTICE	1	2	3	4	5

How many semesters have you exercised with FIT*LIFE*?_____
Do you plan to exercise with FIT*LIFE* again? yes____ no____ Why? or Why not?_____

Please circle the most important reason you chose to exercise with FIT*LIFE*

1. Our cost is lower than the competition.
2. The location of our classes is convenient.
3. Other FIT*LIFE* classes I have taken in the past have been good.
4. I knew the instructor of the class to be good.
5. The class was recommended by a friend.
6. The exercise facilities are good
7. Other (please specify)_____

Please make any additional comments on the back of this page. Your comments are appreciated.

FIT*LIFE* Client Evaluation for Weight Training Classes

This questionnaire has been developed to help us evaluate and improve our program. Please take a few minutes to rate your class & instructor, complete the questionnaire, then return it to your instructor. If you wish, make additional comments on the back. Responses are confidential.

	Poor	Fair	Average	Good	Excellent
CLASS ORGANIZATION	1	2	3	4	5
INSTRUCTOR PUNCTUALITY	1	2	3	4	5
INSTRUCTOR APPEARANCE	1	2	3	4	5
INSTRUCTOR COMMUNICATION OF PROPER LIFTING TECHNIQUES	1	2	3	4	5
INSTRUCTOR KNOWLEDGE CONCERNING EXERCISE AND HEALTH	1	2	3	4	5
INSTRUCTOR COMMUNICATION OF SAFETY TIPS AND MODIFICATIONS	1	2	3	4	5
INSTRUCTOR GUIDANCE THROUGH PERSONALIZED WORKOUT	1	2	3	4	5
SATISFACTION WITH PERSONALIZED WORKOUT REGIMEN	1	2	3	4	5
OVERALL RATING OF YOUR CLASS	1	2	3	4	5
OVERALL RATING OF INSTRUCTOR	1	2	3	4	5
YOUR OVERALL SATISFACTION WITH THE CLASS	1	2	3	4	5
OVERALL RATING OF APPRENTICE	1	2	3	4	5

How many semesters have you exercised with FIT*LIFE*?_____
Do you plan to exercise with FIT*LIFE* again? yes____ no____ Why? or Why not?_____
_____

1. Our cost is lower than the competition.
2. The location of our classes is convenient.
3. Other FIT*LIFE* classes I have taken in the past have been good.
4. I knew the instructor of the class to be good.
5. The class was recommended by a friend.
6. The exercise facilities are good
7. Other (please specify)_____

Please make any additional comments on the back of this page. Your comments are appreciated.

FIT*LIFE* EXERCISE PROGRAM

ACCIDENT REPORT FORM

Date: _____ Time: _____

Name: _____

Address: _____ Phone: _____

Location of Accident: _____

_____

Staff Attending: _____

Witness: _____

Contact Information for witnesses: _____

_____

Details of Accident: _____

_____

_____

Action Taken by Staff: _____

_____

_____

_____

_____

Staff Reporting: _____

Signatures:

FIT*LIFE* Coordinator: _____

FIT*LIFE* Program Director: _____

APPENDIX C

NORMS AND STANDARD VALUES FOR CLINICAL AND FIELD TESTS

Resting Blood Pressure

Body Composition

Handgrip

Push-ups

Sit-ups

Back Strength

Sit and Reach

VO_2 max

Physical Fitness Evaluation Form

Respiratory Values & Norms

BLOOD PRESSURE CLASSIFICATION* AND FOLLOW-UP CRITERIA

<table>
<tr><th rowspan="2">DIASTOLIC BLOOD PRESSURE (mm Hg)</th><th colspan="4">SYSTOLIC BLOOD PRESSURE (mm Hg)</th></tr>
<tr><th>Less than 140</th><th>140 to 159</th><th>160 to 199</th><th>200 or greater</th></tr>
<tr><td rowspan="2">Less than 85</td><td>Normal Blood Pressure</td><td>Borderline Isolated Systolic Hypertension</td><td colspan="2">Isolated Systolic Hypertension</td></tr>
<tr><td>Recheck within 2 years@</td><td colspan="2">1st occasion: Confirm within 2 months
2nd occasion: Evaluate or refer promptly to a physician</td><td>Evaluate or refer to a physician within 2 weeks</td></tr>
<tr><td rowspan="2">85 to 89</td><td>High Normal Blood Pressure</td><td>Borderline Isolated Systolic Hypertension</td><td colspan="2">Isolated Systolic Hypertension</td></tr>
<tr><td>Recheck within 1 year</td><td colspan="2">1st occasion: Confirm within 2 months
2nd occasion: Evaluate or refer promptly to a physician</td><td>Evaluate or refer to a physician within 2 weeks</td></tr>
<tr><td>90 to 104</td><td colspan="4">Mild Hypertension 1st occasion: Confirm within 2 months
2nd occasion: Evaluate or refer promptly to a physician</td></tr>
<tr><td>105 to 114</td><td colspan="4">Moderate Hypertension Evaluate or refer to a physician within 2 weeks</td></tr>
<tr><td>115 or greater</td><td colspan="4">Severe Hypertension Evaluate or refer immediately to a source of care</td></tr>
</table>

* Based on the average of two or more measurements on two or more occasions.

@ Rechecking within one year is recommended on 2nd occasion and for individuals at increased risk (i.e., family history, obesity, blacks, oral contraceptive use, and high alcohol intake).

Source: 1984 Report of the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure.

IDEAL VALUES FOR BODY FAT PERCENTAGE

	Age in years				
	20-29	30-39	40-49	50-59	60+
MEN	14	15	17	18	19
WOMEN	20	21	22	23	24

STANDARD VALUES FOR BODY FAT PERCENTAGE

	Age (yr)				
Rating	**20-29**	**30-39**	**40-49**	**50-59**	**60+**
MEN*					
Excellent	<10	<11	<13	<14	<15
Good	11-13	12-14	14-16	15-17	16-18
Average	14-20	15-21	17-23	18-24	19-25
Fair	21-23	22-24	24-26	25-27	26-28
Poor	>24	>25	>27	>28	>29
WOMEN⊥					
Excellent	<15	<16	<17	<18	<19
Good	16-19	17-20	18-21	19-22	20-23
Average	20-28	21-29	22-30	23-31	24-32
Fair	29-31	30-32	31-33	32-34	33-35
Poor	>32	>33	>34	>35	>36

* From Jackson AS, Pollock ML: Generalized equations for predicting body density of men. BR J Nutr, 40:497-504, 1978.
⊥ From Jackson AS, Pollock ML, and Ward A: Generalized equations for predicting body density of women. Med Sci Sports Exerc, 12:175-182, 1980.

HANDGRIP

STRENGTH RATING SCALE FOR MEN (KG)

Classification	Dominant Grip (kg)
High	>61
Good	50-61
Marginal	43-49
Low	<43

STRENGTH RATING SCALE FOR WOMEN (KG)

Classification	Dominant Grip (kg)
High	>39
Good	32-39
Marginal	23-31
Low	<23

STANDARD VALUES FOR ONE MINUTE PUSHUP ENDURANCE TEST

	Age (yr)				
Rating	20-29	30-39	40-49	50-59	60+
MEN					
Excellent	>55	>45	>40	>35	>30
Good	45-54	35-44	30-39	25-34	20-29
Average	35-44	25-34	20-29	15-24	10-19
Fair	20-34	15-24	12-19	8-14	5-9
Poor	<19	<14	<11	<7	<4
WOMEN					
Excellent	>49	>40	>35	>30	>20
Good	34-48	25-39	20-34	15-29	5-19
Average	17-33	12-24	8-19	6-14	3-4
Fair	6-16	4-11	3-7	2-5	1-2
Poor	<5	<3	<2	<1	<0

(From Pollock ML, Wilmore JH, Fox SM: Health and Fitness through Physical Activity. New York: John Wiley & Sons, 1978.)

Average Values for Back Strength by Age (kg)

Age	Male	Female
10	57.5	48.4
11	69	57.3
12	82.3	63.2
13	99.8	72
14	116	75.8
15	122	76.9
16	132	77.4
17	137	79.4
18	138	80.9
19	142	83.5
20	144	85
21	147	87.2
22	145	87.6
23	144	87.4
24	144	87.2
25	143	87
26	146	86.8
27	143	86.6
28	145	86.4
29	144	86.2
30	144	86
31	143	85.9
32	143	85.8
33	142	85.7
34	142	85.6
35	141	85.5
36	141	85.4
37	140	85.3
38	140	85.2
39	139	85.1
40	138	85.4
41	137	84
42	136	83.4
43	135	83
44	134	82.4
45	133	81.4
46	132	80.4
47	130	79.4
48	128	78.4
49	125	77.4
50	122	76
51	119	75
52	118	74
53	114	73
54	110	72
55	108	70

Average Values for Back Strength by Age cont.

56	105	68
57	102	66
58	100	64
59	98	62
60	97	60
61	95	56
62	94	54
63	92	52
64	90	49
65	89	47
66	88	45
67	86	44
68	85	43
69	84	41.3
70	83	40

STANDARD VALUES FOR ONE MINUTE SITUP ENDURANCE TEST

	Age (yr)				
Rating	20-29	30-39	40-49	50-59	60+
MEN					
Excellent	>48	>40	>35	>30	>25
Good	43-47	35-39	30-34	25-29	20-24
Average	37-42	29-34	24-29	19-24	14-19
Fair	33-36	25-28	20-23	15-18	10-13
Poor	<32	<24	<19	<14	<9
WOMEN					
Excellent	>44	>36	>31	>26	>21
Good	39-43	31-35	26-30	21-25	16-20
Average	33-38	25-30	19-25	15-20	10-15
Fair	29-32	21-24	16-18	11-14	6-9
Poor	<28	<20	<15	<10	<5

(From Pollock ML, Wilmore JH, Fox SM: Health and Fitness through Physical Activity. New York: John Wiley & Sons, 1978.)

STANDARD VALUES FOR TRUNK FLEXION IN INCHES

Age (yr)					
Rating	20-29	30-39	40-49	50-59	60+
MEN					
Excellent	>7	>6	>5	>4	>3
Good	4-6	3-5	2-4	1-3	0-2
Average	-2 - 3	-3 - 2	-4 - 1	-5 - 0	-6 - -1
Fair	-5 - -3	-6 - -4	-7 - -5	8 - -6	-9 - -7
Poor	<-6	<-7	<-8	<-9	<-10
WOMEN					
Excellent	>9	>8	>7	>6	>5
Good	7-8	6-7	5-6	4-5	3-4
Average	1-6	0-5	-1 - 4	-2 - 3	-3 - 2
Fair	-2 - 0	-3 - -1	-4 - -2	-5 - -3	-6 - -4
Poor	<-3	<-4	<-5	<-6	<-7

(Adapted from Golding LA, Myers CR, Sinning WE (eds): The Y's Way to Physical Fitness. Rosemont, IL: YMCA of the USA, 1982.)

MAXIMUM OXYGEN CONSUMPTION CORRELATES

MAXIMUM O_2 UPTAKE ml/kg∀min^{-1}	*METs	@TIME ON TREADMILL (BRUCE PROTOCOL)	1.5-MILE RUN (min:sec)
7	2	--	--
10.5	3	--	--
14	4	2:30	--
17.5	5	4:00	--
21.0	6	6:00	--
24.5	7	7:20	--
28.0	8	8:20	18:45
31.5	9	9:15	16:30
35.0	10	10:10	15:00
38.5	11	11:00	13:00
42.0	12	12:00	12:00
45.5	13	12:45	11:00
49.0	14	13:40	10:00
52.5	15	14:30	9:30
56.0	16	15:15	9:00
59.5	17	16:10	8:15
63.0	18	17:00	7:45
66.5	19	18:00	7:15
70.0	20	19:20	6:52
73.5	21	21:00	6:30
77.0	22	22:30	6:10

* MET refers to metabolic equivalent above the resting metabolic level. Value at rest is approximately 3.5 ml/kg∀min^{-1}.

@ Data expressed in minutes and seconds of test protocol (duration) completed.

(Adapted with permission from Pollock, M.L., Wilmore, J.H, and Fox, S.M.: Health and Fitness Through Physical Activity. New York, John Wiley and Sons, 1978.)

STANDARDS FOR EVALUATION AEROBIC FITNESS (VO_2MAX)

Values are in ml O2/kg/min

AGE	LOW	FAIR	AVERAGE	GOOD	HIGH
WOMEN					
20-29	≤24	24-30	31-37	38-48	≥49
30-39	≤20	20-27	28-33	34-44	≥45
40-49	≤17	17-23	24-30	31-41	≥42
50-59	≤15	15-20	21-27	28-37	≥38
60-69	≤13	13-17	18-23	24-34	≥35
MEN					
20-29	≤25	25-33	34-42	43-52	≥53
30-39	≤23	23-30	31-38	39-48	≥49
40-49	≤20	20-26	27-35	36-44	≥45
50-59	≤18	18-24	25-33	34-42	≥43
60-69	≤16	16-22	23-30	31-40	≥41

Physical Fitness Evaluation Form Rating Scale

Norms -- Males 35 Years and Younger

Name:_____ Dates: T_1 _____ T_2 _____ T_3

			Max. Oxygen Uptake						3 Min Step Test Post	
Percentage Ranking	Rating	PWC Max Kgm	Liters/ min.	ml/kg	Mets	Trunk Flexion ins.	Bench Press Repetitions	Sit ups 1 min. Reps	Ex. HR 1 min. BPM	Resting HR BPM
95	Excellent	2000	4.61	54	15.	21	35	45	81	51
85	Good	1800	3.89	49	14.	19	29	41	99	59
75	Above Avg.	1700	3.49	46	13.	17	24	37	103	65
50	Average	1500	3.08	36	10.	15	20	33	120	72
30	Below Avg.	1300	2.67	32	9.	12	15	28	123	78
15	Fair	1200	2.27	28	8.	9	11	23	127	84
5	Poor	1000	1.55	24	7.	7	7	18	136	92
YOUR SCORE	T_1									
	T_2									
	T_3									

Physical Fitness Evaluation Form Rating Scale

Norms -- Males 36-45 Years Old

Name:_____ Dates: T_1 _____ T_2 _____ T_3

			Max. Oxygen Uptake						3 Min Step Test Post	
Percentage Ranking	Rating	PWC Max Kgm	Liters/ min.	ml/kg	Mets	Trunk Flexion ins.	Bench Press Repetitions	Sit ups 1 min. Reps	Ex. HR 1 min. BPM	Resting HR BPM
95	Excellent	1800	4.35	53	15.	22	30	42	84	54
85	Good	1600	3.65	45	13.	19	24	38	98	60
75	Above Avg.	1500	3.26	39	11.	16	19	32	112	66
50	Average	1300	2.86	33	9.	14	17	27	120	72
30	Below Avg.	1100	2.46	29	8.	12	14	21	125	78
15	Fair	1000	2.07	25	7.	10	10	18	129	84
5	Poor	900	1.37	23	6.	5	3	11	138	92
YOUR SCORE	T_1									
	T_2									
	T_3									

Physical Fitness Evaluation Form Rating Scale

Norms -- Males 46 Years and Older

Name:_____ Dates: T_1 _____ T_2 _____ T_3

			Max. Oxygen Uptake						3 Min Step Test Post	
Percentage Ranking	Rating	PWC Max Kgm	Liters/ min.	ml/kg	Mets	Trunk Flexion ins.	Bench Press Repetitions	Sit ups 1 min. Reps	Ex. HR 1 min. BPM	Resting HR BPM
95	Excellent	1700	3.64	43	12.	20	28	38	90	54
85	Good	1500	3.07	38	11.	17	22	33	102	59
75	Above Avg.	1400	2.74	34	10.	15	19	26	111	64
50	Average	1200	2.41	30	9.	13	16	21	120	72
30	Below Avg.	1000	2.08	27	8.	11	12	18	124	78
15	Fair	900	1.75	24	7.	8	8	15	130	84
5	Poor	800	1.18	20	6.	5	3	10	138	95
YOUR SCORE	T_1									
	T_2									
	T_3									

Physical Fitness Evaluation Form Rating Scale

Norms -- Females 35 Years and Younger

Name:_____ Dates: T_1 _____ T_2 _____ T_3

			Max. Oxygen Uptake						3 Min Step Test Post	
Percentage Ranking	Rating	PWC Max Kgm	Liters/ min.	ml/kg	Mets	Trunk Flexion ins.	Bench Press Repetitions	Sit ups 1 min. Reps	Ex. HR 1 min. BPM	Resting HR BPM
95	Excellent	1700	3.32	55	15.	23	30	39	79	59
85	Good	1500	2.74	45	13.	21	24	34	94	63
75	Above Avg.	1300	2.42	39	11.	20	20	30	109	68
50	Average	1100	2.09	34	10.	18	16	25	118	72
30	Below Avg.	900	1.76	30	9.	15	13	20	122	80
15	Fair	700	1.44	26	7.	14	10	15	129	84
5	Poor	500	.86	20	6.	11	5	10	137	92
YOUR SCORE	T_1									
	T_2									
	T_3									

Physical Fitness Evaluation Form Rating Scale

Norms -- Females 36 - 45 Years Old

Name:_____ Dates: T_1 _____ T_2 _____ T_3

			Max. Oxygen Uptake						3 Min Step Test Post	
Percentage Ranking	Rating	PWC Max Kgm	Liters/ min.	ml/kg	Mets	Trunk Flexion ins.	Bench Press Repetitions	Sit ups 1 min. Reps	Ex. HR 1 min. BPM	Resting HR BPM
95	Excellent	1600	3.04	49	14.	23	29	39	79	59
85	Good	1400	2.55	43	12.	21	21	29	90	64
75	Above Avg.	1200	2.27	37	10.	19	18	22	106	70
50	Average	1000	1.99	33	9.	17	15	18	118	75
30	Below Avg.	800	1.71	29	8.	14	11	12	125	80
15	Fair	600	1.43	26	7.	12	7	9	134	88
5	Poor	400	.99	22	6.	10	4	4	145	92
YOUR SCORE	T_1									
	T_2									
	T_3									

Physical Fitness Evaluation Form Rating Scale

Norms -- Females 46 and Older

Name:_____ Dates: T_1 _____ T_2 _____ T_3

			Max. Oxygen Uptake						3 Min Step Test Post	
Percentage Ranking	Rating	PWC Max Kgm	Liters/ min.	ml/kg	Mets	Trunk Flexion ins.	Bench Press Repetitions	Sit ups 1 min. Reps	Ex. HR 1 min. BPM	Resting HR BPM
95	Excellent	1500	2.80	46	13.	22	30	24	84	59
85	Good	1300	2.32	38	11.	19	22	20	97	63
75	Above Avg.	1100	2.04	32	9.	18	18	17	108	67
50	Average	900	1.77	27	8.	15	14	14	118	73
30	Below Avg.	700	1.50	24	7.	14	9	11	124	78
15	Fair	500	1.22	20	6.	11	5	7	130	84
5	Poor	30	.74	18	5.	9	2	2	145	92
YOUR SCORE	T_1									
	T_2									
	T_3									

List of Normal Respiratory Values

Test (Units)	Normal Male (M)	Normal Female (F)	Prediction Equation*	LLN⊥
TLC (1)	6.8	5.2	(M) 0.076H - 6.69 (F) 0.0646H - 5.44	-1.37 -1.10
FVC (1)	5.0	3.5	(M) 0.0844H -0.0298A - 8.78 (F) 0.0444H - 0.0169A - 3.19	x0.78 x0.752
RV (1)	1.8	1.7	TLC -FVC	
FRC (1)	3.4	2.6	50% pred TLC	
FEV_1 (1)	4.1	2.9	(M) 0.0665H -0.0292A - 6.51 (F) 0.0332H - 0.0190A - 1.82	x0.791 x0.779
FEV_1% (%)	82	83	(M) -0.105A + 86.7 (F) -0.1852H-0.1896A+ 121.7	x0.869 x0.859
FEF_{25-75} (1/sec)	4.3	3.3	(M) 0.0579H -0.0363A - 4.52 (F) 0.0300H - 0.0309A - 0.41	x0.553 x0.448
$Vmax_{50}$ (1/sec)	5.2	3.9	(M) 0.0684H -0.0366A - 5.54 (F) 0.0321H - 0.0240A - .44	x0.651 x0.542
MVV (1/min)	168	112	(M) 1.15H -1.27A + 14 (F) 0.55H - 0.72A + 50	-33 -33

*H = height in centimeters; A= age in years; P_a = barometric pressure.
†Add or subtract number shown or multiply the predicted value by the factor shown.
‡Static compliance from deflation limb of static pressure-volume curve.

References for Table on Normal Respiratory Values

This table can be used to further classify spirometric measurements into classes of impairment.

Source: Norman Jones, Clinical Exercise Testing, 3rd Edition, W.B. Saunders Co., p.112.1988.

Class	**Spirometry**
Class I (non)	FEV_1 and VC both within ± 20% predicted
Class II (mild)	FEV_1 or VC both below 60% predicted
Class III (moderate)	FEV_1 or VC both 40-60% predicted
Class IV (severe)	FEV_1 or VC below 40% predicted
Class V (very severe)	FEV_1 or VC both 40% predicted

APPENDIX D

BODY COMPOSITION

Anatomical Landmarks for Skinfolds and Girth Measures

Examples of Selected Skinfold Measurements

Generalized Body Composition Equations

Estimated Residual Volume and Percent Fat equations

Density of Water at Different Temperatures

Anatomical Landmarks for Skinfold and Girth Measures

Skinfold Fat Sites:

Chest diagonal fold one third (women) or one half (men) of the distance between the anterior-axillary line and nipple

Axilla vertical fold on the midaxillary line at approximately the level of the xiphoid process at the lower end of the breast bone.

Triceps vertical fold on the posterior midline of the upper arm (over triceps), halfway between the acromion and olecranon process with the elbow extended and relaxed.

Subscapular fold taken on a diagonal line coming from the vertebral border 1 centimeter from the inferior angle of the scapula

Abdominal vertical fold adjacent to and approximately 2 centimeters laterally from the umbilicus

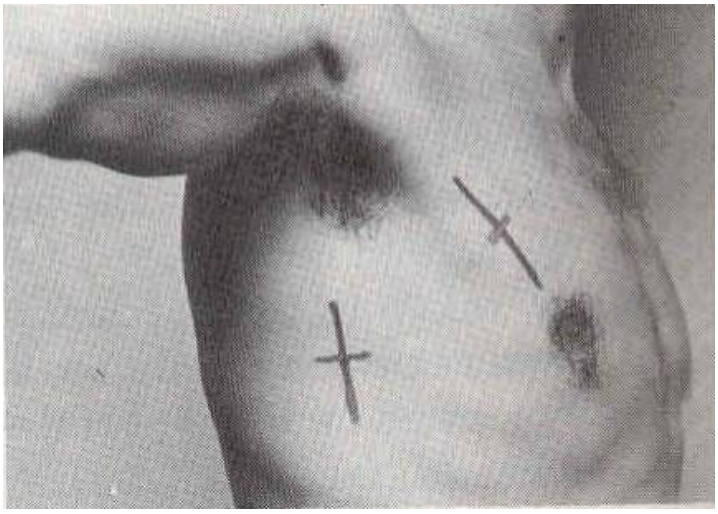
Suprailiac diagonal fold on the crest of the ilium at the anterior axillary line

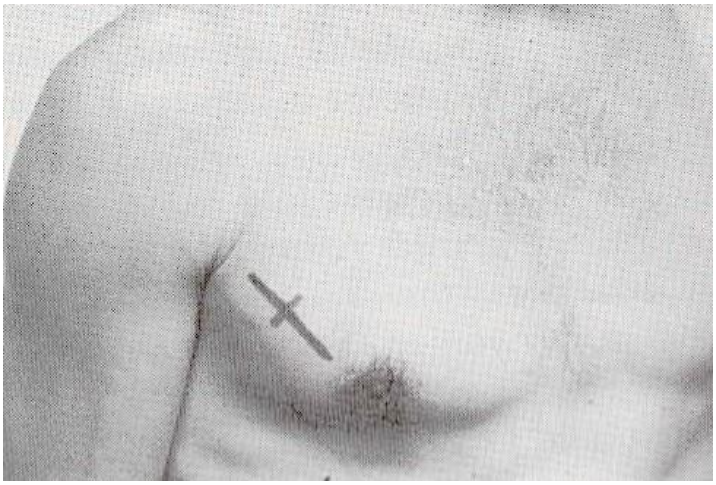
Thigh vertical fold on the anterior aspect of the thigh midway between the hip and knee joints.

Girth Measurements:

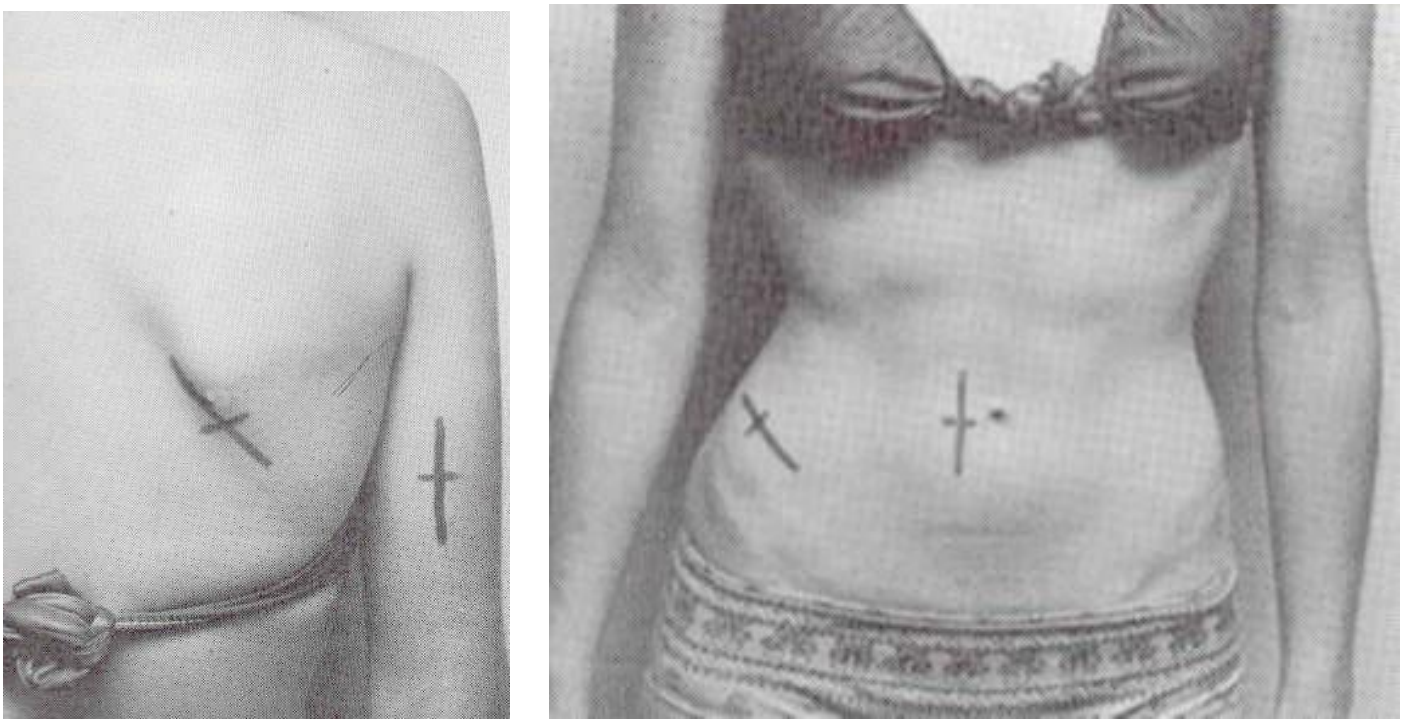
Waist Circumference: taken using a measuring tape at the level of the belly button

Hip Circumference: taken using a measuring tape at the level of the greatest gluteal girth

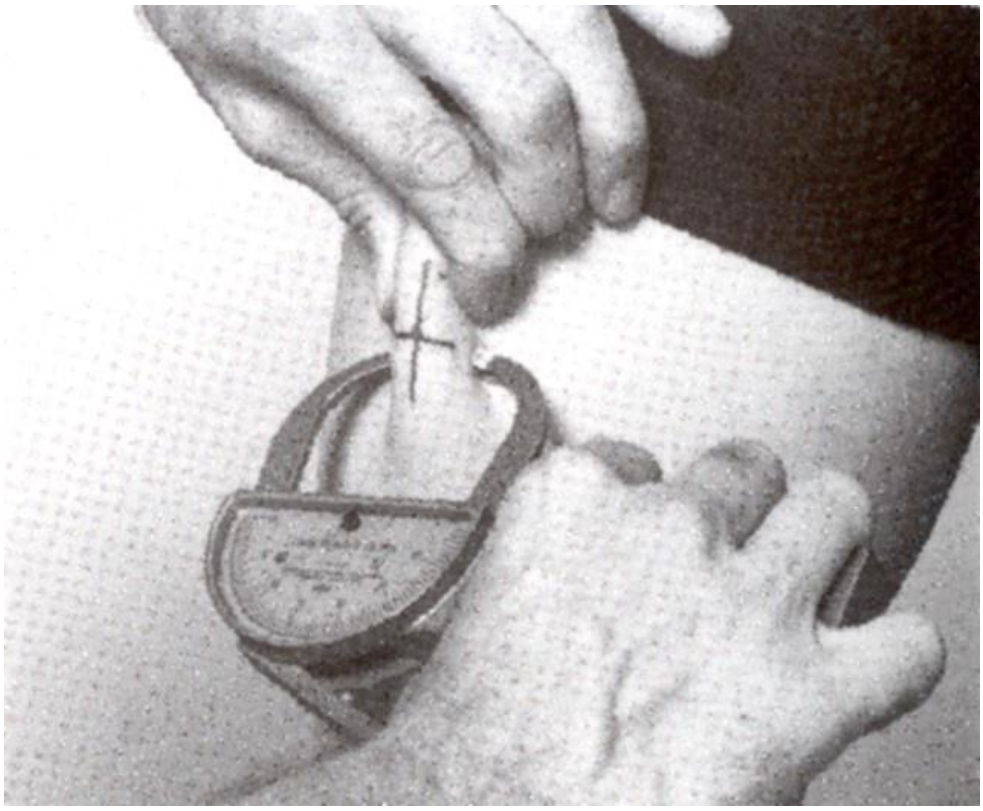




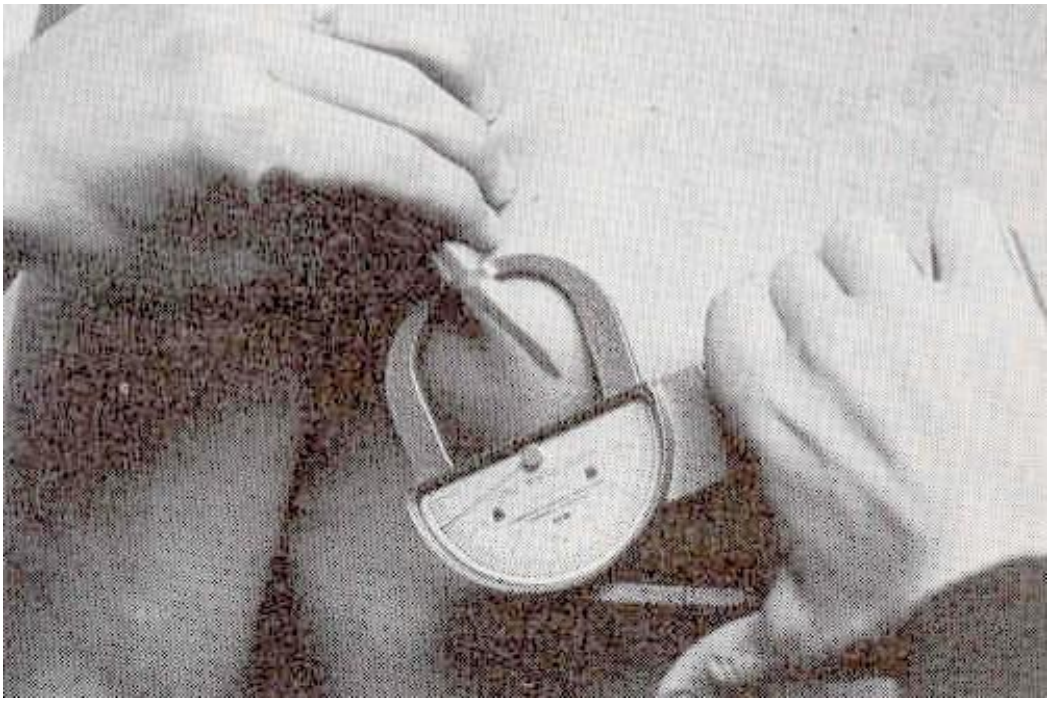
chest and axilla skinfold sites



Subscapular, Tricep, Suprailiac, and Abdominal skinfold sites



Thigh skinfold site and technique



chest skinfold technique

Generalized Body Composition Equations

Males

7-Site formula
Body Density = 1.11200000 -0.00043499 (sum of seven skinfolds) + 0.00000055 (sum of seven skinfolds) squared - 0.00028926 (AGE)
(chest, axilla, triceps, subscapular, abdominal, suprailium, thigh)

6-Site formula (YMCA)
Percent body fat = .21661 (sum of six skinfolds) - .0029 (sum of six skinfolds) squared + .13341 (AGE) - 5.72888
(chest, thigh, suprailium, abdomen, tricep, subscapular)

4-Site formula (YMCA)
Percent body fat = .27784 (sum of four skinfolds) - .00053 (sum of four skinfolds) squared + .12437 (AGE) - 3.28791
(chest, ilium, abdomen, axilla)

3-Site formula
Body density = 1.1093800 - 0.0008267 (sum of three skinfolds) + 0.0000016 (sum of three skinfolds) squared - 0.0002574 (AGE)
(chest, abdomen, thigh)

Body density = 1.1125025 - 0.0013125 (sum of three skinfolds) + 0.0000055 (sum of three skinfolds) squared - 0.0002440 (AGE)
(chest, triceps, subscapular)

Females

7-Site formula
Body Density = 1.0970 - 0.00046971 (sum of seven skinfolds) + 0.00000056 (sum of seven skinfolds) squared - 0.00012828 (AGE)
(chest, axilla, triceps, subscapular, abdominal, suprailium, thigh)

5-Site formula (YMCA)
Percent body fat = .29731 (sum of 5 skinfolds) - .00053 (sum of 5 skinfolds) squared + .03037 (AGE) - .63054
(thigh, suprailium, abdomen, tricep, subscapular)

3-Site formula (YMCA)
Percent body fat = .41563 (sum of three skinfolds) - .00112 (sum of three skinfolds) squared + .03661 (AGE) + 4.03653
(triceps, abdomen, suprailium)

Body density = 1.0994921 - 0.0009929 (sum of three skinfolds) + 0.0000023 (sum of three skinfolds) squared - 0.0001392 (AGE)
(triceps, suprailium, thigh)

Body density = 1.089733 - 0.0009245 (sum of three skinfolds) + 0.0000025 (sum of three skinfolds) squared - 0.0000979 (AGE)
(triceps, suprailium, abdomen)

SOURCE: Adapted from Jackson, 1985; Golding, YMCA

BODY COMPOSITION CALCULATIONS

BW = total body weight
FW = fat weight
LBW = lean body weight (fat free weight or weight of fat free mass)
IBW = ideal body weight
%FAT = body fat percentage
%IF = desired body fat percentage
D_b = body density
W_a = body weight in air (kg) (SAME AS TOTAL BODY WEIGHT)
W_w = body weight in water (kg) *scale weight - tare weight
D_w = density of the water at the water temperature
RV = residual volume (liters)
VG = visceral gas (estimated at .1 liter)
WL = BW - IBW

*RV estimate: Men = .017(age in years) + .06858(ht in inches) - 3.477
Women = .009(age in years) + .08128(ht in inches) - 3.9

$$D_b = \frac{W_a}{\frac{(W_a - W_w)}{D_w} - (RV + VG)}$$

$$\%FAT \text{ (Brozek)} = 4.57/D_b - 4.142 \quad \text{(Siri)} = 4.95/D_b - 4.5$$

1. CALCULATE FAT WEIGHT — FW = %FAT x BW
2. CALCULATE LEAN BODY WEIGHT — LBW = BW - FW
3. CALCULATE IDEAL BODY WEIGHT — LBW = (1 - %IF) x IBW; IBW = LBW / (1 - %IF)
4. CALCULATE DESIRED WEIGHT LOSS — WL = BW - IBW

EXAMPLE

SEX:	MALE
AGE:	42
WEIGHT:	210
%FAT:	29
%IF:	17

FW = .29 x 210 = 61
LBW = 210 - 61 = 149
IBW = 149 / (1 - .17) = 180
WL = 210 - 180 = 30

Estimated Residual Volume & Percent Fat Equations

Tech Name

Subject Name_____ Age_____ Date

Height_____ (in)_____(cm) _____Weight[1] _____(lbs)_____(kg)

ANTHROPOMETRIC DATA

Skinfold Fat Measures (mm)

	1	2	MEAN[2]		1	2	MEAN[2]
Chest	_____	_____	_____	Abdominal			
Axilla	_____	_____	_____	Suprailiac			
Triceps	_____	_____	_____	Thigh			
Subscapular	_____	_____	_____	Biceps			

PREDICTED RESIDUAL VOLUME (RV)

1. From: Wilmore, J. Med. Sci. Sports 1(2):87-90, 1969.

Vital Capacity (VC) 1._____L. 2._____L. 3._____L.

Spirometer Temperature_____CE
VC (ATPS) *BTPS Factor _____= VC (BTPS)____ L.

Males: RV(BTPS)_____L. = .24*VC (BTPS)
Females: RV(BTPS)_____L. = .28*VC (BTPS) _____

2. From Goldman, 1959.

Males: RV(L) = .069H + 0.017A - 3.45 Where: H=Height in inches
Females: RV(L) = .081H + 0.009A - 3.90 A= Age in years

MEASURED RESIDUAL VOLUME From Nitrogen Washout_____L

[1] Weight of body minus weight of bathing suit
[2] Mean of two measures that meet the accuracy of ± 5%
[3] Mean of two measures that meet the accuracy of ± 1%

Density of Water at Different Temperatures

Temperature CE	D_w (grams/ml)
21	0.9980
22	.9978
23	.9975
24	.9973
25	.9971
26	.9968
27	.9965
28	.9963
29	.9960
30	.9957
31	.9954
32	.9951
33	.9947
34	.9944
35	.9941
36	.9937
37	.9934
38	.9930
39	.9926
40	.9922

Source: Weast, R.C. (Ed.): Handbook of Chemistry and Physics, 54th ed. Cleve - The Chemical Rubber Company, 1967, p. F-11.

Appendix E

Metabolic Calculations
Oxygen Debt & Excess Post Exercise O2 Consumption
Testing Protocol Oxygen Usage Equivalents per Stage
Fatty Acid Metabolism: Debunking the Myth
Oxygen Costs of Selected Activities
Exercise in the Heat
Exercise at Altitude
Medical and Biomechanical Terminology
Drugs

METABOLIC CALCULATION EQUATIONS

Resting Metabolic Rate (RMR) = 1 MET = 3.5 ml O_2/kg body wt/min = 1 kcal/kg/hr

1 Liter O_2 = 5 Kcal = 2153 kgm = 15,575 ft-lbs.

1 kgm = 9.807 joules 1 kg = 2.2 lbs. 1 mph = 26.8 meters/min

1 watt = 6.1 kgm/min 1 lb FAT = 3500 Kcal

DERIVATIONS OF THE FICK EQUATION

$$\mathbf{VO_2}_{(\text{ml O2/min})} = \mathbf{Q}_{(\text{L blood/min})} \times \mathbf{AVO_2\ diff}_{(\text{ml O2/L blood})}$$

$$\mathbf{VO_2}_{(\text{ml O2/min})} = \mathbf{HR}_{(\text{beats/min})} \times \mathbf{SV}_{(\text{L blood/beat})} \times \mathbf{AVO_2\ diff}_{(\text{ml O2/L blood})}$$

$$\mathbf{VO_2}_{(\text{ml O2/min})} = \mathbf{HR}_{(\text{beats/min})} \times \mathbf{SV}_{(\text{L blood/beat})} \times \mathbf{(CaO_2}_{(\text{ml O2/L blood})} - \mathbf{CvO_2}_{(\text{ml O2/L blood})}\mathbf{)}$$

$$\mathbf{VO_2}_{(\text{ml O2/min})} = \mathbf{HR}_{(\text{beats/min})} \times \mathbf{SV}_{(\text{L blood/beat})} \times \mathbf{((1.34}_{(\text{ml O2/g Hb})} \times \mathbf{[Hb]}_{(\text{g Hb/100 ml blood})} \times \mathbf{SaO_2}_{(\text{\% O2 sat.})} \times \mathbf{10}) - (\mathbf{1.34}_{(\text{ml O2/g Hb})} \times \mathbf{[Hb]}_{(\text{g Hb/100 ml blood})} \times \mathbf{SvO_2}_{(\text{\% O2 sat.})} \times \mathbf{10})\mathbf{)}$$

multiplication by 10 in the above equation converts ml O2/100 ml blood to ml O2/L blood (the unit on the "10" in the above equation is: "ml O_2/liter of blood/ml O_2/100 ml blood")

USEFUL EQUATIONS INVOLVING RELATIVE MEASURES OF O_2 CONSUMPTION

$$\mathbf{EI}_{(\text{mets})} = \mathbf{VO_2}_{(\text{ml O2/min})} \mathbf{/\ body\ wt}_{(\text{kg})} \mathbf{/\ 3.5}_{(\text{ml/kg/min/MET})}$$

$$\mathbf{EI}_{(\text{kcal/min})} = \mathbf{EI}_{(\text{mets})} \times \mathbf{Body\ wt}_{(\text{kg})} \times \mathbf{.0175}_{(\text{kcal/kg/min/MET})}$$

GENERAL EQUATION FOR SPIROMETRY CALCULATION OF VO_2

$$\mathbf{VO_2}_{(\text{ml O2/min})} = \mathbf{(V_I}_{(\text{ml O2/min STPD})} \times \mathbf{F_IO_2)} - \mathbf{(V_E}_{(\text{ml O2/min STPD})} \times \mathbf{F_EO_2)}$$

Q = Cardiac Output
AVO_2 diff = difference in volume of oxygen between arterial and venous blood
VO_2 = Maximum oxygen consumption
HR = Heart Rate
SV = Stroke Volume
EI = Exercise intensity
[Hb] = Concentration of Hemoglobin
CaO_2 = content (volume) of Oxygen in Arterial blood
V_I = volume of inspired air
V_E = Volume of expired air
CvO_2 = content (volume) of oxygen in venous blood
SaO_2 = saturation (% expressed as a decimal) of arterial blood with oxygen
SvO_2 = saturation (% expressed as a decimal) of venous blood with oxygen
F_EO_2 = fractional concentration (% expressed as a decimal) of oxygen in expired air
F_IO_2 = fractional concentration (% expressed as a decimal) of oxygen in inspired air

ACSM EQUATIONS FOR ESTIMATING OXYGEN CONSUMPTION

WALKING - speeds 50 to 100 m/min : 1.9 to 3.7 mph

Horizontal Component: $VO_{2\ ml/kg/min}$ = SPEED $_{m/min}$ x 0.1 $_{ml\ O2/kg/min/m/min}$

Vertical Component: $VO_{2\ ml/kg/min}$ = SPEED $_{m/min}$ x %GRADE x 1.8 $_{ml\ O2/kg/min/m/min}$

Resting component: $VO_{2\ ml/kg/min}$ = 3.5 $_{ml/kg/min}$

Total $VO_{2\ ml/kg/min}$ = sum of the resting, horizontal, and vertical components

RUNNING - speeds > 134 m/min : > 5 mph (this equation can also be used for slower speeds (3 - 5 mph) if truly running)

Horizontal Component: $VO_{2\ ml/kg/min}$ = SPEED $_{m/min}$ x 0.2 $_{ml\ O2/kg/min/m/min}$

Vertical Component: $VO_{2\ ml/kg/min}$ = SPEED $_{m/min}$ x %GRADE x 0.9

Resting Component: $VO_{2\ ml/kg/min}$ = 3.5 $_{ml/kg/min}$

Total $VO_{2(ml/kg/min)}$ = sum of the resting, horizontal and vertical components

CYCLE & ARM ERGOMETRY

Cycle: $VO_{2\ ml/min}$ = (WORK RATE $_{kgm/min}$ x 2 $_{mlO2/kgm}$) + (3.5 $_{ml/kg/min}$ x BODY WEIGHT $_{kg}$)

Arm: $VO_{2\ ml/min}$ = (WORK RATE $_{kgm/min}$ x 3 $_{mlO2/kgm}$) + (3.5 $_{ml/kg/min}$ x BODY WEIGHT $_{kg}$)

WORK RATE = RESISTANCE $_{kg}$ x PEDAL REVOLUTION CIRCUMFERENCE $_{m/rev}$ x RPM $_{rev/min}$

PEDAL REVOLUTION CIRCUMFERENCE: **Monarch - 6 m/rev** **Tunturi - 3 m/rev**

STEPPING

$VO_{2\ ml/kg/min}$ = (RATE $_{steps/min}$ x .35 $_{ml/kg/min/steps/min}$) + (HEIGHT $_{m/step}$ x RATE $_{steps/min}$ x 1.8 $_{ml/kg/min/m/min}$ x 1.33)

MAXIMAL OXYGEN UPTAKE - Definition: The maximal rate at which oxygen can be taken in and utilized to produce energy during maximal work. It is expressed in absolute terms as liters O_2/minute and in relative terms as ml

0_2/kg/minute.

PREDICTED MAXIMAL OXYGEN UPTAKE CAPACITY EQUATIONS(ml/kg/min)

Active Men	=	69.7 - [0.612 x (age in years)]
Sedentary Men	=	57.8 - [0.445 x (age in years)]
Active Women	=	42.9 - [0.312 x (age in years)]
Sedentary Women	=	42.3 - [0.356 x (age in years)]

Predicted VO_2max = 74.99 - [11.89 x (sex$^+$)] - [0.413 x (age in years)] - [3.37 x (Physical Status^{++})]

$^+$Sex: Male = 1, Female = 2.
$^{++}$Physical Status: Active = 1, Sedentary = 2.

ESTIMATED OXYGEN UPTAKE CAPACITY FOR TREADMILL TEST

Foster Equation For the Bruce Protocol:

VO_2(ml/kg/min) = 14.8 - [1.379 x (Time)] + [0.451 x (Time^2)] - [0.012 x (Time^3)]

Time = time to volitional fatigue expressed in minutes (and fraction of minutes)

Additional Equations for the Bruce Protocol:

VO_2 (ml/kg/min) = 6.70 + [0.056 x (Duration in Seconds)] - [2.82 (sex$^+$)]

VO_2 (Active Men) = 0.19 + [3.78 x (Duration in Minutes)]

VO_2 (Sedentary Men) = 4.07 + [3.29 x (Duration in Minutes)]

Balke Protocol:

VO_2 (ml/kg/min) = [1.8 x Speed (m/min)] x [0.073 + % grade expressed as decimal]
VO_2(ml/kg/min) = 1.444 x [Time in Minutes + **14.99**]

Naughton Protocol:
VO_2 (ml/kg/min) = 1.61 x [(treadmill time in minutes) + 3.60]

FUNCTIONAL AEROBIC IMPAIRMENT: The measured VO_2 of an individual expressed as a percentage of their age-predicted VO_2; it may be positive (below expected levels), or negative (above expected levels).

Calculation: $FAI = \frac{[\text{Predicted } VO_2 - \text{Observed } VO_2]}{\text{Predicted } VO_2} \times 100$

RATE PRESSURE PRODUCT: an indication of the oxygen utilization of the myocardium.

Calculation: $\frac{\text{MAX. SYS. BP} \times \text{MAX H.R.}}{100}$

Normal values: Men - 325 and higher; Women - 275 and higher

BLOOD FLOW (mmHg) THROUGH A VASCULAR BED (ml / sec) = **(P1)** UPSTREAM PRESSURE (mmHg) - **(P2)** DOWNSTREAM PRESSURE

(R) VASCULAR RESISTANCE (mmHg ≅ sec / ml)

Series Circuit: $F = \frac{P1 - P2}{\Sigma R's}$ Parallel Circuit: $F = \Sigma (1 / R's) \times (P1 - P2)$

O2 DELIVERY TO TISSUES (ml O2/ min) = FLOW (ml blood / min) x O2 CONCENTRATION (ml O2 / ml blood)

note: O2 concentration is often given in units of ml% (ml O2 / 100 ml blood) and must be converted to ml O2 / ml blood conversion: divide the ml% unit by 100

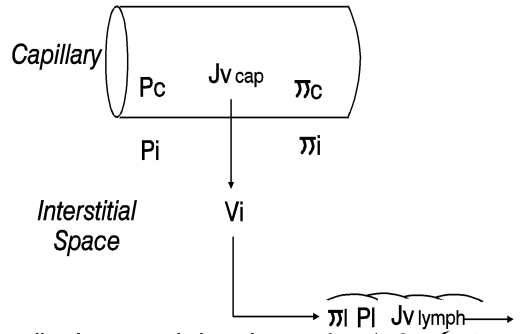
FLUX OF FLUID THROUGH CAPILLARIES TO THE INTERSTITIUM AND THROUGH THE LYMPHATIC SYSTEM

$Jv_{cap} = Lp \times S \times [(Pc - Pi) - \sigma(\pi c - \pi i)]$

$Jv_{lymph} = Lp \times S \times (Pi - Pl)$ note: $\sigma = 0$ for lymphatic system

Jv_{cap} = filtration rate (ml / min / 100 grams of tissue)
Lp = hydraulic conductance (cm / sec / mmHg)
S = surface area (cm^2 / 100 grams of tissue)
Pc = capillary hydrostatic pressure (mmHg)
Pi = interstitial hydrostatic pressure (mmHg)
Pl = lymphatic hydrostatic pressure (mmHg)
σ = reflection coef. (no units)
πc = capillary oncotic pressure (mmHg)
πl = interstitial oncotic pressure (mmHg)
Jv_{lymph} = lymphatic flow rate (ml / min / 100 grams of tissue)

CAPILLARY FILTRATION AND LYMPH FLOW



Normally, Jv cap = Jv lymph and interstitial fluid volume (Vi) remains constant

THE "INDEX" CONCEPT OF CARDIOVASCULAR PARAMETERS

In many research studies dealing with the various effects of certain independent variables on cardiovascular parameters, the parameters are expressed in terms that account for individual body size and shape. Terms such as cardiac output or end systolic volume are divided by body surface area to form the terms cardiac index and end systolic volume index. the units on these two particular terms would be l/min/m^2 and ml/m^2.

DUBOIS AND DUBOIS EQUATION FOR ESTIMATION OF BODY SURFACE AREA

$SA(m^2) = (H^{.725} \times W^{.427} \times 71.84) / 10000$

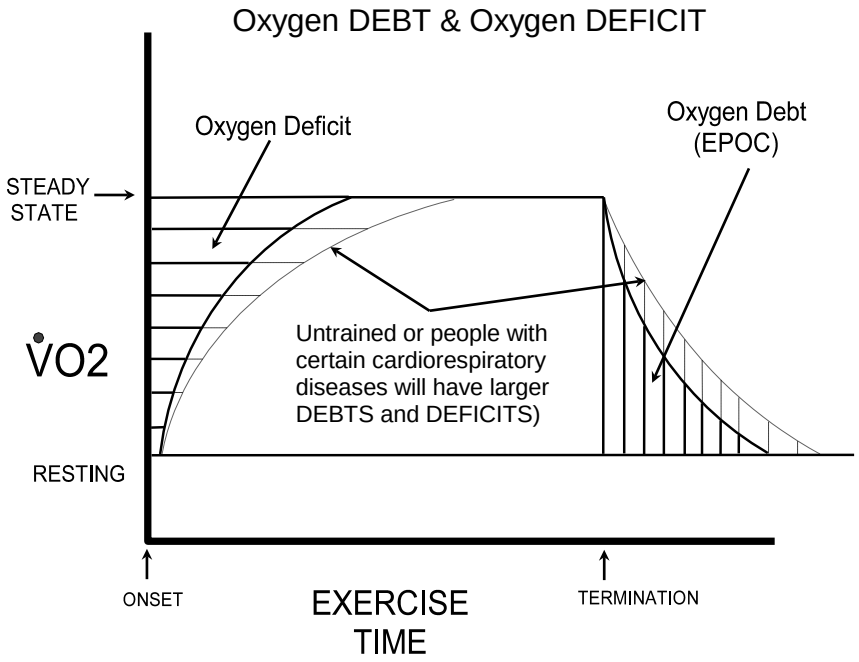
H = height in centimeters
W = weight in kilograms

HARRIS AND BENEDICT EQUATIONS FOR PREDICTING RESTING ENERGY EXPENDITURE

(MEN) REE(kcal/day) = 5.003(H) + 13.75(W) + -6.775(A) + 66.5

(WOMEN) REE(kcal/day) = 1.85(H) + 9.563(W) + -4.676(A) + 655.1
H = height in centimeters
W = weight in kilograms
A = age in years

OXYGEN KINETICS & EXCESS POST-EXERCISE O2 CONSUMPTION



O2 Deficit -the amount of oxygen that would have been consumed if steady-state aerobic metabolism began at exercise onset minus the oxygen that was actually consumed - this represents the anaerobic energy contribution to the beginning of endurance exercise.

O2 Debt - Excess Post Exercise Oxygen Consumption (EPOC) - the amount of oxygen consumed during recovery from exercise that is in excess of normal resting consumption

Alacticide Debt (Rapid) - the part of the oxygen debt that contributes to the restoration of phosphates (ATP & CP) - takes about 3 minutes (half life of rebuilding phosphate stores = about 20 seconds)

Lacticide Debt (Slow) - the part of the oxygen debt that contributes to the removal and resynthesis (gluconeogenesis in the liver) of lactic acid - takes about 1:40 (half life = about 25 minutes) contributes to:

Reoxygenation of blood and other body tissues
Accommodation of body □ temperature and □ metabolism
□ levels of circulating epinephrine

EPOC Contribution to the Caloric Cost of Exercise

Arm Cranking @ 60% VO2 Max for 20 min
O2 debt calories: 9.2 Kcal RER = .88

Sedlock RQES 6/91

Cycle Ergometry @ 60% VO2 Max for 20 min
O2 debt calories: 10.4 Kcal RER = .90

INTENSITY	TIME	EPOC (L)	KILOCALORIES	EPOC / O2 DEFICIT	
30% VO2 Max	20 min	1	5	1.8	
30% VO2 Max	50 min	1.43	7.15	.8	
30% VO2 Max	80 min	1.04	5.2	2.4	
					Gore & Withers
50% VO2 Max	20 min	3.14	15.7	1.6	EUR J APP PHYS 60 1990
50% VO2 Max	50 min	5.19	26.0	3.1	
50% VO2 Max	80 min	6.1	30.5	3.4	
70% VO2 Max	20 min	5.68	28.4	1.9	
70% VO2 Max	50 min	10.04	50.2	3.5	
70% VO2 Max	80 min	15.0	75.0	4.5	

Fatty Acid Oxidation During Exercise - Debunking the Low Intensity Weight Loss Myth

Fat utilized in metabolism comes from 3 major sources:

1. intramuscular triglycerides (elevated at rest and more depleted after exercise in trained individuals)
2. circulating triglycerides (bound to albumin)
3. adipose cell triglycerides

It is estimated that between 30% - 50% of the fat metabolized during exercise comes from adipose tissue

At exercise onset of moderate intensity, anaerobic metabolism supplies most of the energy, followed by glucose oxidation. Within a few minutes, there is increased reliance on fat metabolism, and the RER drops as exercise progresses.

The higher the concentration of slow oxidative fibers in the exercising muscle, the higher the FFA oxidation capability

Because of a lack of α-glycerokinase, glycerol cannot be "re-used" to form adipose triacylglycerols, therefore, the rate of lipolysis in the body can be estimated from increases in plasma glycerol.

1. Acute Exercise ↑ sympathoadrenal activity + ↓ Insulin → stimulation of hormone sensitive lipase ↑ lipolysis

(Epinephrine, norepinephrine, glucagon, growth hormone, or thyroxine stimulate adenylate cyclase in adipose cells which causes and increase in cyclic-AMP. This, in turn, stimulates protein kinase to phosphorylate the lipase causing the hydrolysis of triacylglycerol. It should be noted that trained individuals have higher concentrations of both skeletal muscle lipoprotein lipase and adipose tissue lipoprotein lipase)

2. Liberated fatty acids are bound to albumin and transported to exercising muscle tissues where they diffuse into the cells

3. Acetyl carnitine transferase catalyzes the transport of fatty acid across the mitochondiral membrane

4. Fatty acids enter β−oxidation where they form fatty Acetyl-Co-A which can be utilized in the TCA cycle

Regulation of Fatty Acid Metabolism

↑ substrate availability ↑↓ malonyl-Co-A → acetyl carnitine transferase inhib. → ↓ FFA transp. into mitoch. → ↓ FFA metabolism

↑ substrate availability ↑↓ energy charge of cells → β-oxidation enzymes are inhibited → ↓ FFA metabolism

Graded Exercise Test Results (BRUCE) of 36 Year Old 88.9 kg Male on a Low Fat Diet

VO_2 max = 5.216 L/min = 58.7 ml/kg/min

Stage	VO_2 (ml/min/)	RER	total kcal/min	FAT kcal/min	CHO kcal/min
1	1312	.78	6.27	4.62	1.65
2	2255	.84	10.94	5.78	5.16
3	3445	.90	16.96	5.51	11.45
4	4568	1.04	23.05	0.0	23.05
5 (@ 1:00)	5216	1.05	26.33	0.0	26.33
50% VO_2 max	2608	≅.88	12.78	5.01	7.77
75%VO_2 max	3912	≅.94	19.45	3.76	15.69
30 minute bout at 50%VO_2 max			383.4 kcal	150.3 kcal	233.1 kcal
30 minute bout at 75%VO_2 max			583.5 kcal	112.8 kcal	470.7 kcal

From the above exercise test and corresponding calculations, one can conclude that their exists an ideal RER (exercise intensity) that maximizes the total number of calories derived from fats. In this example, it would be somewhere in between stage 2 and stage 3 (between RERs of .84 and .90), indicating a relatively low intensity. This does not mean, however, that low intensity exercise is more conducive to adipose tissue loss. For example, the above individual exercises at the relatively low intensity of the first stage of the BRUCE protocol for 1 hour. His total caloric expenditure is 376.2 kcals, 277.2 of which come from fat and 99 from carbohydrate. Most of the calories have been derived from fat and the body's glycogen and carbohydrate stores have not been taxed. Now consider what happens after the next meal. Specifically, the carbohydrate portion of the newly available substrate will increase the cytosolic [citrate] in the liver (major site of fatty acid synthesis) and other body tissues. This will stimulate Acetyl-Co-A carboxylase which catalyzes the formation of Malonyl-Co-A (this is the committed step in fatty acid synthesis). Thus fatty acid synthesis is stimulated and the fat that was consumed in excess during the exercise bout is replaced. One can therefore argue that the major focus of an exercise program designed to help one loose weight should be the total number of calories expended and not the substrate from which the calories were provided.

Approximate Metabolic Cost Of Various Activities

Running	
6 min miles	16.3 METS
7 min miles	14.1 METS
8 min miles	12.5 METS
9 min miles	11.2 METS
10 min miles	10.2 METS
11 min miles	9.4 METS
12 min miles	8.7 METS
Walking	
3 mph	3 METS
3.5 mph	4 METS
Cycling	
leisure	5.5 METS
10 mph	7 METS
Swimming	9 METS
Basketball	8 METS
Tennis	7 METS
Racquetball Handball	8 METS
Downhill Skiing	8 METS
X-country Skiing	11 METS
Touch Football	8 METS
Softball	6 METS
Horseback Riding & Sailing	3.5 METS
Lawn Work Gardening	5.0 METS
Moving or Pushing Heavy Objects or Carrying 90 Object	8.3 METS
Shoveling, Carpentry or Concrete Work	5.7 METS
Housework or Janitorial Work	3.0 METS

Exercise in the Heat and Temperature Regulation

Homeostasis - the maintenance of a constant or unchanging internal environment.
Homeotherms - animal that maintain a constant core temperature.
Wet-bulb Globe Temperature - a measure of heat stress index
Globe Temperature - the temperature recorded from a thermometer surrounded by a black metal sphere designed to measure radiant heat
Wet-bulb Temperature - the temperature recorded when a thermometer with a wet wick surrounding the bulb is exposed to rapid movement of air

Modes of Heat Loss

1. **Radiation** (60%) - loss of heat from one surface to another via infrared rays
2. **Evaporation** (25%) - most important - heat transferred to sweat & sweat turns to vapor

(on a humid day, the vapor pressure of the air is close to that of sweat on skin 6 9 evaporation)
(evaporation is the only method of heat loss when the surrounding temperature is > body temperature)

3. **Convection** (12%) - 8 number of air / water molecules moving over skin 6 8heat removal
4. **Conduction** (3%) - loss of heat from the body to an object in physical contact with it

Mechanisms of Heat Production and Cold Adaptation

1. **Shivering** - most important - maximized muscle tone - 4X 8 in heat production
2. **Skin Vasoconstriction**
3. **Piloerection** - hairs standing on end & "goose bumps" - not important in humans
4. **Non-Shivering-Thermogenesis** - 3-4 week acclimization - sympathetic induced oxidation of food (related to brown fat - oxidative phosphorylation is uncoupled and heat is produced)
5. Release of thyroxin increases cellular metabolism producing heat

Mechanisms of Heat Dissipation

1. **Sweating** - controlled by sympathetic cholinergic fibers
   An individual who has been exposed to heat for 1-6 weeks sweats more profusely (acclimization) and exhibit increased production of aldosterone causing a decrease in the amount of Na^+ and Cl^- in sweat.

2. **Vascular Adjustments**
   a. Anatomical Arterio-Venous Shunt - in a warm environment, blood is diverted to the superficial plexus whereas in a cold environment blood is diverted to the deep plexus

   b. Countercurrent Heat Exchange - in a warm environment, venous blood is routed to the surface whereas in a cold environment venous blood is routed deep and close to an artery where is can be warmed by the close proximity of arterial blood

The Hypothalamus is the thermostat for the body - attempts to keep body at a "set point" of about 37EC
in heat - heat producing mechanisms are inhibited and the sweat mechanism is activated
in cold - inhibition of heat producing mechanism is stopped and production of thyroxine is indirectly stimulated

Adaptations to Regular Exercise in the Heat

1. 8plasma volume
2. 8sweat rate
3. earlier onset of sweating
4. 9NaCl loss in sweat
5. 9 skin blood flow

Physiological Consequences of Exercise Induced Dehydration

1. 9 plasma volume (prevented by fluid ingestion)
2. 8 plasma osmolality (caused by 8 [Na^+] - raises temp. at which skin blood flow 8 & delays onset of sweating)
3. 9 sweat rate hyperhydration prior to exercise 8 sweat rate
4. 8 rectal and esophageal temperatures (fluid ingestion reduces these temperatures only after 60-80 minutes)
5. 8 HR & 9 SV (Q and SV will not 9 if fluids are replaced, HR will still 8 - HR is 9 by hyperhydration prior to exercise
6. 8 release of atrial natriuretic peptide, ADH, aldosterone and renin
7. 9 rate of gastric emptying (8 rate of intestinal absorption)

Fluid Replacement During Exercise in the Heat

1. primary goal of fluid replacement is to maintain plasma volume, which increases skin blood flow
2. consume about 1/2 liter of cold water 10-20 minutes before exercising - ingest 1/4 liter @ 10-15 minute intervals
3. In endurance activities in the heat you can loose 2000 ml of fluid / hour - gastric emptying rate = 800 ml / hour
4. 8 osmolality of fluid 6 9 gastric emptying rate: do not drink "athletic drinks" with a [sugar] > 8%
5. fluid ingestion may help prevent "cardiovascular drift"
6. fluid ingestion prevents 8 in serum osmolality and [Na^+]

plasma volume expansion alone does not influence esophageal or rectal temperature response to exercise when saline infusion was used to maintain pre-exercise levels of osmolality and [Na^+], suggesting that plasma volume expansion in and of itself should not be the focus of fluid replacement, but preventing elevations in osmolality and [Na^+] should also be emphasized. It should also be noted that, in addition to fluid and electrolyte replacement, glucose infusion was necessary to prevent increases in HR and VO_2 associated with "cardiovascular drift" at a constant submaximal workload.

ALTITUDE RESPONSES TO EXERCISE

(PO_2 must 9 by 50% before chemoreceptors respond: ie. about 10,000 feet)

IMMEDIATE

1. decreased arterial PO_2 causes hyperventilation
2. increase in the alkalinity of body fluids
3. increased resting HR
4. increased HR response to submaximal exercise (increased Q at submaximal exercise)
5. in general - an increased metabolic response at a given workload

LONG TERM ADJUSTMENT

1. □ PCO_2 at altitude causes acid/base imbalance ϖ acid buffering capability is decreased
2. decrease plasma volume ϖ increased hematocrit
3. increased hemoglobin formation & concentration
4. increased oxygen content of arterial blood
5. increased in number of red blood cells (polycythemia) - and red blood cell 2,3 DPG
6. possible increase in capillarity density in skeletal muscle tissue
7. increase in the number of mitochondria
8. increase in aerobic enzymes

THE OXYGEN CARRYING CAPACITY OF BLOOD MAY INCREASE UP TO 28% AT HIGH ALTITUDES

Acute (Immediate) Adaptations to Altitude

Alt. 6 9P_aO_2 6 8V_A 6 9P_aCO_2 6 8pH (8pH 6 9V_A limiting the increased resp. response to the 9 P_aO_2)

6 8Q (8HR)

Long Term Adaptations to Altitude

2-5 days at Alt. 6 kidneys excrete HCO_3^- 6 9pH 6 8V_A (resp. compensation mechanism is overridden)

months at Alt 6 polycythemia + 8[Hb] + 8blood volume (8viscosity 6 9capillary flow {ie mountain sickness})

6 8diffusion capacity (8blood volume 6 capillary expansion 6 8 diffusion surface area in lungs)

6 8 lung volume (number and size of alveoli)

6 8capillary density

6 8 levels of 2-3 DPG 6rightward shift of oxygen dissociation curve

Medical and Biomechanical terminology

1. Atrophy - degeneration
2. Hypertrophy - over development
3. Vascular - having rich blood supply
4. Avascular - no or little blood supply (knee joint is a good example)
5. Vasodilation - to dilate or enlarge vessels
6. Somatic death - cell death
7. Vasoconstriction - to constrict or close vessels
8. Necrosis - Calcium deposition 18-24 hours after injury
9. Edema - fluid accumulation in a particular area
10. Exostoses - bony outgrowth (heel spur)
11. Trauma - an injury, or wound, to living tissue by an outside force
12. Hyperextension - to extend past the normal range of motion
13. Necrosis - death of cells, or tissue (with calcium deposition)
14. Congenital - deformity from birth
15. Prosthesis - artificial device to aid the body
16. Lordosis - abnormal forward curvature of the lumbar vertebrae
17. Scoliosis - abnormal lateral curvature of the cervicothoracic vertebrae
18. Kyphosis - stoop shoulders
19. Luxation - complete dislocation
20. Subluxation - partial dislocation (still some articulation)
21. Anomaly - irregular
22. Condyle - the articular prominence on a bone
23. Proximal - nearest
24. Distal - remote
25. Origin - beginning
26. Insertion - the inserting point (the place where the action takes place)
27. Fascia - membrane like covering of muscle
28. Diagnosis - recognition of a disease, or anomaly, by its symptoms
29. Prognosis - the prospect of recovery as anticipated from the ususal course of disease or injury
30. Stabilization - fixed, steady
31. Hematoma - encapsulated blood
32. Sprain - a joint twist resulting in some ligament tissue tear
33. Strain - a strain or stretchin of the muscle
34. Ecchymosis - the escape of blood from ruptured blood vessels
35. Posterior - from the back
36. Articulation - where two bones form a junction
37. Medial - toward midline
38. Lateral - away from midline
39. Epiphysis - open end of bones
40. Hydrotherapy - the use of liquids as therapeutic modalities
41. Ligament - attaches bone to bone (with a few exceptions)
42. Tendon - attaches muscle to bone
43. Cellulitis - inflammation of tissue
44. Tetany - spasm of musculature
45. Therapeutic modalities - a controlled remedy applicable to injuries
46. Effusion - escape of blood from normal containment into adjacent tissues, or cavities
47. Cyro - cold
48. Thermo - heat
49. Embolism - a moving blood clot
50. Thrombus - a stationary blood clot
51. . . . itis - suffix meaning inflammation of
52. Ankylosed - immobility of a joint
53. Cicatrix - scar
54. Crepitus - grating sound produced by bones or joints
55. Enthesitis - calcification around tendons, ligaments and muscle insertions (compare to # 7exostoses)
56. Etiology - study of causes of a disease

57. Glycosuria - high sugar in the urine
58. Idiopathic - caused by an unknown factor (self-originated)
59. Keloid - fibrous material
60. Osteochondritis - inflammaion of bone and cartilage
61. Psychogenic - of psychic origin
62. Syndrome - a group of typical symptoms that characterize a deficiency or a disease
63. Trauma - wound or injury
64. Genu valgum - knock knees (genu = knee)
65. Genu varum - bowed legs
66. Pes cavas - high instep
67. Pes planus - flat feet
68. Genu recurvatum - hyperextended knee
69. Kypholordosis - combination of kyphosis and lordosis
70. Ventral - pertaining to the belly (venter: a belly shaped part) - same as anterior in humans
71. Caudal - pertaining to the tail (cauda: a taillike appendage) - same as posterior in humans
72. Cephallic - pertaining to the head
73. Oblique - slanting - between horizontal and vertical

BONES AND JOINTS

The articulation of two or more bones allows various types of movement. The extent and kind of movement determine the name applied to the joint.

1. **Synarthroidial** - immovable joints - such as sutures in the skull
2. **Amphiarthroidia**l - slightly movable - such as the spinal column
3. **Diarthroidal** - freely movable joints such as the knee, ankle, etc.

TYPES OF DIARTHROIDAL JOINTS IN REGARD TO MOVEMENT

A. **Condyloid** - biaxial joint permitting movement in two planes at right angles to each other (example: wrist joint)
B. **Enarthroidal** - (Ball and socket) swivle type with widest range of motion. (example: hip and shoulder)
C. **Arthroidial** (gliding) - relatively free moving gliding motion (example: intercarpal and intertarsals)
D. **Ginglymoid** - (hinge joint) example: elbow, knee, ankle
E. **Trochoid** - (pivot joint) joint permitting retation only (example: radioulnar and alantoaxial joint)
F. **Reciprocal** (saddle joint) example: carpometacarpal joint of thumb

MOVEMENTS IN JOINTS

In many joints, several different movements are possible. Some joints permit only flexion and extension, whereas others permit a wide range of movements, depending upon the joint structure.

Flexion - bending; bringing bones together as in the elbow joint when the hand is being drawn to the shoulder; exception is the shoulder joint movement of the humerus to the front, a forward movement, also is considered flexion.
Extension - straightening; moving bones apart, as in the hand moving away from the shoulder; exception; shoulder joint return movement from the shoulder joint flexion.
Eversion - turning the sole outward; weight on the inner edge of the foot
Inversion - turning the sole inward; weight on the outer edge of the foot
Rotation outward - on axis of bone toward body, as in the humerus being turned outward
Rotation inward - on axis of bone toward body; as in the humerus being turned inward
Rotation upward - rotation against gravity, as in turning the glenoid fossae upward in the scapula
Rotation downward - rotation with gravity, as in returning the glenoid fossae to normal position from upward rotation
Plantar flexion - movement of the sole downward toward the floor
Pronation - rotation on the axis of the bone, specifically applied to the forearm as turning the palm of the hand posteriorly
Supination - rotation on the axis of the bone, specifically applied to the forearm as in turning the hand up by rotating the radius on the ulna
Abduction - movement away from the axis or trunk, as in raising the arms to the side horizontally, the leg sideward, and the scapula away from the spinal column
Adduction - movement toward the axis of the trunk in lowering the arms to the side
Circumduction - circular movement of the joint, combining movements; possible in the shoulder joint, hip joint, and trunk around a fixing joint

METRIC SYSTEM

t	tera	10^{12} times (a unit)
g	giga	10^{9} times (a unit)
m	mega	10^{6} times (a unit)
k	kilo	10^{3} times (a unit)
h	hecto	10^{2} times (a unit)
dk	deka	10^{1} times (a unit)
d	deci	10^{-1} times (a unit)
c	centi	10^{-2} times (a unit)
m	milli	10^{-3} times (a unit)
Φ	micro	10^{-6} times (a unit) - micron
n	nano	10^{-9} times (a unit)
Δ	Angstrom	10^{-10} times (a unit) = 3.937 x 10^{-9} in.
p	pico	10^{-12} times (a unit)

Length

Unit		Metric Equivalent		U.S. Equivalent		
millimeter	(mm)	0.001	meter (1 mm)	0.03937	inch	
centimeter	(cm)	0.01	meter (1 cm)	0.3937	inch	(1in = 2.54 cm)
decimeter	(dm)	0.1	meter (1 dm)	3.937	inches	
METER	(m)	1.0	meter	39.37	inches	(1 yd. = .9144 m)
dekameter	(dkm)	10.0	meters	10.93	yards	(1 m = 1.0936 yds = 3.28 feet)
hectometer	(hm)	100.0	meters	328.08	feet	
kilometer	(km)	1000.0	meters (1 km)	0.6214	miles	(1 mi = 1.61 km)

Weight or Mass

Unit		Metric Equivalent		U.S. Equivalent		
milligram	(mg)	0.001	gram	0.0154	grain	
centigram	(cg)	0.01	gram	0.1543	grain	
decigram	(dg)	0.1	gram	1.543	grains	
GRAM	(g)	1.0	gram	15.43	grains	(1 gram = .03527 oz.)
Dekagram	(dkg)	10.0	grams	0.3527	ounce	(1 oz = 28.35 grams)
hectogram	(hg)	100.0	grams	3.527	ounces	
kilogram	(kg)	1000.0	grams	2.2	pounds	(1 pound = .4536 kg)

Capacity

Unit		Metric Equivalent		U.S. Equivalent		
milliliter	(ml)	0.001	liter	0.034	fluid ounce	(1 fl oz = 29.41 ml)
centiliter	(cl)	0.01	liter	0.338	fluid ounce	
deciliter	(dl)	0.1	liter	3.38	fluid ounce	
LITER	(l)	1.0	liter	1.0567	liquid quarts	(1 liq. quart = .9453 liters)
dekaliter	(dkl)	10.0	liters	0.284	bushel	
hectoliter	(hl)	100.0	liters	2.837	bushels	
kiloliter	(kl)	1000.0	liters	264.18	gallons	

Area

Unit		Metric Equivalent		U.S. Equivalent		
square millimeter	(mm^2)	0.000001	centare	0.00155	square inch	
square centimeter	(cm^2)	0.0001	centare	0.155	square inch	
square decimeter	(dm^2)	0.01	centare	15.5	square inches	
CENTARE or square meter	(ca) (m^2)	1.0	centare	10.76	square feet	($1m^2$ = .000247 acres)
hectare or square hectometer	(ha) (hm^2)	10,000.0	centares	2.47	acres	
square kilometer	(km^2)	1,000,000.0	centares	0.386	square miles	(1 sq. mile = 2.59 sq. km)

Volume

Unit		Metric Equivalent		U.S. Equivalent	
cubic millimeter	(mm^3)	0.001	cubic centimeter	0.016	minim
Cubic centimeter	(cc, cm^3)	0.001	cubic decimeter	0.061	cubic inch
cubic decimeter	(dm^3)	0.001	cubic meter	61.023	cubic inches
STERE also cubic meter	(s) (m^3)	1.0	cubic meter	1.308	cubic yards
cubic dekameter	(dkm^3)	1000.0	cubic meters	1307.943	cubic yards
cubic hectometer	(km^3)	1,000,000.0	cubic meters	1,307,942.8	cubic yards
cubic kilometer	(km^3)	1,000,000,000.0	cubic meters	0.25	cubic mile

U.S. SYSTEM

Liquid Measure

4 gills	=	1 pint (pt.)
2 pints	=	1 quart (qt.)
4 quarts	=	1 gallon (gal.)
31.5 gallons	=	1 barrrel (bbl.)
2 barrels	=	1 hogshead
60 minims	=	1 fluid dram (fl. dr.)
8 fluid ounces	=	1 pint

Linear Measure

1 mil	=	0.001 inch (in.)
12 inches	=	1 foot (ft.)
3 feet	=	1 yard (yd.)
6 feet	=	1 fathom
5.5 yard	=	1 rod (rd.)
40 rods	=	1 furlong
1760 yards	=	1 mile

Square Measure

144 square inches (sq. in.)	=	1 square foot (sq. ft.)
9 square feet	=	1 square yard (sq. yd.)
30.25 square yards	=	1 square rod (sq. rd.)
160 square rods	=	1 acre (A.)
4840 sq. yards	=	1 acre
43,560 sq. feet	=	1 acre
640 acres	=	1 square mile (sq. mi.)

Dry Measure

2 pints	=	1 quart (qt.)
8 quarts	=	1 peck (pk.)
4 pecks	=	1 bushel (bu.)
3.28 bushel	=	1 barrel (bbl.)

Avoirdupois Weight

27.34 grains	=	1 dram (dr. av.)
16 drams	=	1 ounce (oz. av.)
16 ounces	=	1 pound (lb. av.)
2000 pounds	=	1 short ton (sh. tn.)
2240 pounds	=	1 long ton (l. tn.)

Cubic Measure

144 cubic inches	=	1 board foot
1728 cubic inches	=	1 cubic foot (cu. ft.)
27 cubic feet	=	1 cubic yard (cu. yd.)
128 cubic feet	=	1 cord (cd.)

MISC.

1 foot pound = 1.356 joules = .1383 kg - meters
1 feet / minute = .01136 miles / hour
1 horsepower = 550 foot-pounds / sec
1 joule = .102 kg - meters
1 knot = 1.151 statute miles / hour = 1 nautical miles / hour
1 light year = 5.9×10^{12} miles
1 watt = 44.27 foot - pounds / min = 1 joule / sec = .001341 horsepower

Speed of Light (c) = 2.9979×10^{8} meters / sec
Plancks Constant (h) = 6.626×10^{-34} Joule $\cong$ s
Avogadors number (N_A) = 6.02×10^{23} molecules / mole
Gas Constant (R) = 8.3144 Joules / mole $\cong$ K
Ideal Gas Volume at STP (V_m) = .0024 m^3 / mole

Drug Effects, Mechanisms, and Exercise Interactions

DOCUMENT LAYOUT

left hand column | **right hand column**

Generic Name (Brand Name in parentheses)
{information in brackets} [indications in braces]

Hemodynamic effects - side effects
Mechanisms of action in right hand

KEY

u	= increase or increases	HR	= heart rate
d	= decrease or decreases	BP	= blood pressure
NC	= no change	EXAT	= exercise angina threshold
r	= causes, leads to, or logically follows	TPR	= total peripheral resistance
CNS	= central nervous system	CHF	= congestive heart failure
ST	= ST segment	SE	= side effects
VSM	= vascular smooth muscle		

SPECIAL NOTE: new drugs for all kinds of diseases come on the market literally every day, therefore the ones listed here are some of the more common ones. For the most recent drugs, consult a Physician's Desk Reference (PDR) or look up the drug on the Internet

Pharmacological Terminology

Agonist - a drug that brings about a response by direct action

Antagonist - a drug that blocks or blunts the actions of an agonist

Competitive Antagonist - a drug whose action can be overcome by increasing the concentration of an agonist (EXAMPLE: Beta Blockers do not completely prevent the HR from increasing. They blunt or "compete" with the actions of the catecholamine agonist)

Non-competitive Antagonist - a drug whose action completely blocks the action of an agonist

Antianginal

Nitrates

[Angina, Coronary Artery Spasm]	□ HR-(via baroreceptors) □ BP □ EXAT
Nitroglycerin (Nitrobid, Nitrodur patch, Tridil, Nitrostat	Venous & arterial vasodilator
Nitrolingual spray, Nitrol Ointment,	□ Myocardial O_2 supply
Transderm Nitro, Nitro disc)	□ Myocardial O_2 demand
Isorbide Dinitrate (Isordil, Sorbitrate, Dilatrate SR)	□ Preload & Afterload
Isorbide Mononitrate (Ismo, Monoket)	Reduces coronary artery spasm
Pentaerythritol tetranitrate (Cardilate)	May produce dizziness & syncope
	No effect on contractility
	8 or NC in exercise HR
	Postural hypotension may result from long term use
	Use of nitrates may cause a reversal of ST depression
	Use of nitrates may cause a reversal of ST depression

MECHANISM

Nitrates provide an exogenous source of endothelial derived relaxation factor (EDRF) now known to be nitric oxide (NO). NO_2 is thought to oxidize sulfhydryl nitrate receptors causing relaxation of smooth muscle. It also activates guanylate cyclase, stimulating GTP. This causes an increase in cyclic GMP which facilitates Ca^{++} reduction in the smooth muscle cells which, in turn results in vasodilation. (A tolerance can be built up when most of the sulfhydryl receptors are oxidized from excess exposure to the drug.)

Beta Blockers (olol's)

[Angina, Hypertension, Arrhythmias, MI, headaches]
Propanolol (Inderol)
Labetolol - □ and □ blocker -1:3 (Trandate Normodyne)
Pindolol (Viskin)
Timolol (Blocadren)
Nadolol (Corgard)
Metaprolol Tartrate (Lopressor)*
Acebutolol (Sectral)*
Atenolol (Tenormen)*
Betaoxolol (Kerlone)*
Carteolol (Cartrol)
Bisoprolol (Zebeta)
Penbutolol (Levatol)
Toprol* (Metaprolol)

□ HR □ BP □ EXAT
□ Myocardial O_2 Supply by □ dias. C A filling time
□ Myocardial O_2 Demand
□ Contractility
Blocks β adrenergic receptors
Consider discont. before Tst ϖ False - for ischemia
Induced Bradycardia ϖ U-Waves
□ post MI mortality and arrhythmic sudden death
□ BP by suppressing renin release & □ cardiac output
Effects are temporary & dose related
May depress signs of hypoglycemia in diabetics
□ platelet aggregation
□ max HR
May □ exercise capacity in fit individuals
May □ triglycerides - □ HDL {less in cardioselective}
Most will □ HDL

*Cardioselective - Greater effect on□□$_1$ receptors
□□$_1$ receptors - stimulation increases HR & contractility
□□$_2$ receptors - stimulation relaxes bronchial and vascular smooth muscle

SE: blocking of b_2 mediated vasodialtion6unopposed a peripheral arteriolar constriction causing:
decreased cold tolerance
coronary artery vasoconstriction
worsening of coronary artery spasm
worsening of bronchospasm (from inhibition of b_2 receptor mediated bronchodilation)

SE: 9 in the sympathetic mediated signs of hypoglycemia and 9 catecholamine mediated glycogenolysis
□-blockers are not usually prescribed for insulin dependent diabetics

SE: bradycardia and AV-block, fatigue, depression, impotence, vivid or bizarre dreams

MECHANISM
Beta blocking drugs work by competitively binding with beta agonists, preventing their action. Beta agonists bind to a receptor with a stimulatory G-protein and cause adenylate cyclase to convert ATP to cyclic-AMP. The cyclic-AMP, acting with a protein kinase, enhances phosphorylation of Ca^{++} channels which allow more Ca^{++} to enter the cell during voltage induced depolarization. In turn this Ca^{++} enhances Ca^{++} release from the SR which increases cytosolic Ca^{++}. This increases conduction, HR, and contractility.

Calcium Channel Blockers

[angina, CA spasm, hypertension, atr. tach, atr. fib]	□ HR □ BP □ EXAT
Verapamil (Isoptin, Calan)	Delay ischemia
Diltiazem (Cardizem)	□ Myocardial O_2 Supply
Nifedipine (Procardia Adalat) {IHR}	□ Myocardial O_2 Demand (consumption)
Nicardipine (Cardene) {more effective in VSM, IHR}	□ Atrioventricular conduction rate
Nitrendipine	
Nisoldipine (Sular)	□ Contractility
Nimodipine (Nimotop)	9Ca^+ influx in cardiac & VSM
Amlodipine (Norvasc)	9Coronary artery spasm & angina
Felodipine (Plendil)	Drug of choice for variant angina
Isradapine (DynaCirc)	Bepridil68 QT interval6arrhythmias
Bepridil (Vascor)	

MECHANISM

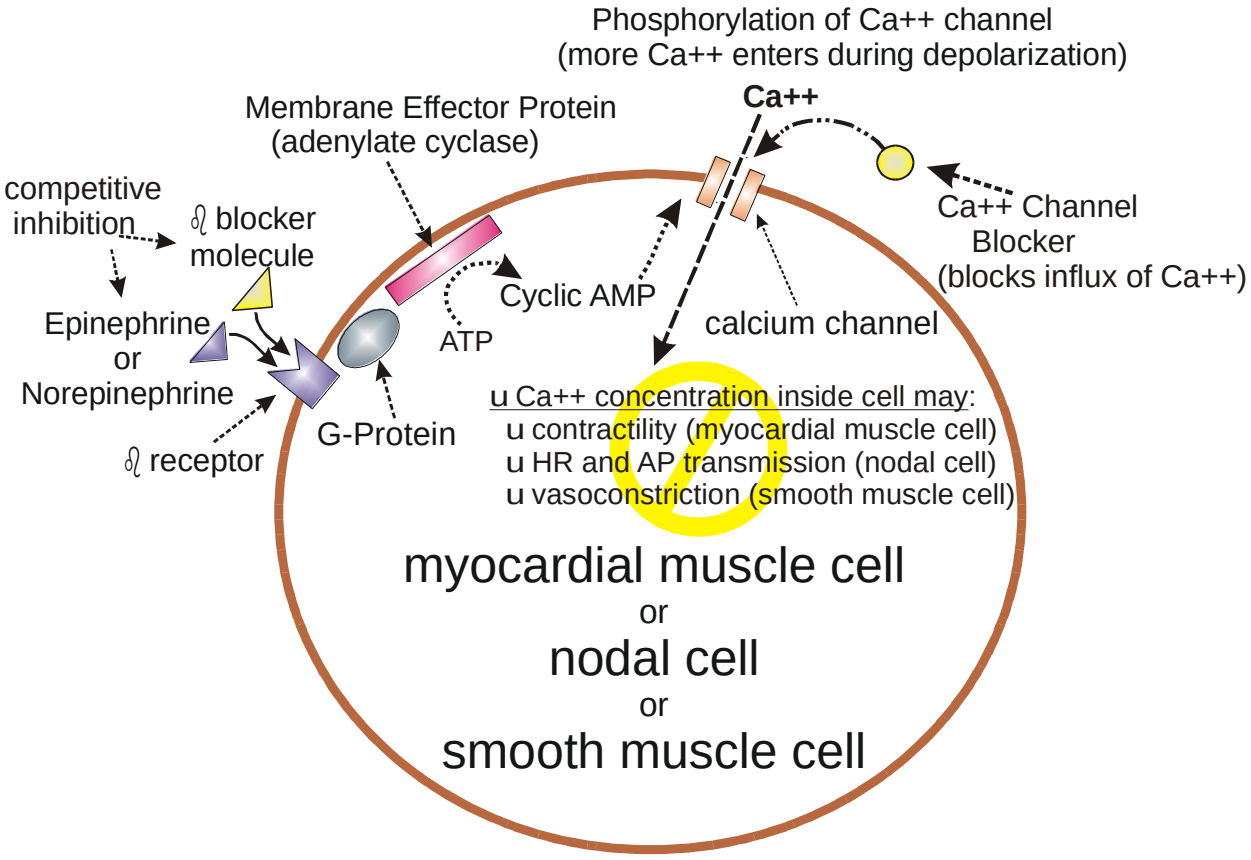
Ca^{++} antagonist work by selectively inhibiting the inward Ca^{++} current in tissues where the action potential has a dominant Ca^{++} upstroke (not fired by a fast Na^+ signal). Such tissues include vascular smooth muscle and nodal tissue.

SE: resulting peripheral vasodilation6headache, flushing, orthostatic intolerance, dizziness, syncope

SE: Verapamil69 intestinal smooth muscle contraction6 constipation

SE: nifedipine6large veno-dilatory effects6peripheral edema

*Note that some Calcium Channel Blockers listed above may produce an increase in heart rate {IHR} .



Thiazide type diuretics

Hydrochlorothiazide (Esidrix-Hydrodiuril)
Chlorothalidone (Hygronton)
Indapamide (Lozol)
Metolazone (Zaroxolyn, Diulo)

Inhibits Na^+ & Cl^- Absorption
Induced hypokalemia r PVC's, Arrhythmias
SE: hypokalemia, hyperuricemia, hypoglycemia, insulin resistance, hypercalcemia, d libido, hyperliproteinemia

Loop Diuretics (mostly emergency drugs)

Furosemide (Lasix)
Ethacrynic acid (Edecrin)
Bumetanide (Bumex)
Torsemide (Demadex)

Used only in heart or renal failure patients

Potassium Sparing Diuretics

Spironolactone (Aldactone)
Amiloxide (Midamor)
Triamterene (Dyrenium)

Hyperkalemia r Tall T-waves

Combinations of Regular and Potassium Sparring Diuretics

Dyazide
Maxzide

Alpha-1 Blockers {peripheral vasodilation}
Terazosin HCL (Hytrin)
Doxazosin (Cardura)
Prazosin (Minipress)
Indoramin (Baratol, Wydora)

NC in HR d BP
Marked hypotension - postural hypotension

Peripheral Vasodilators

[CHF & Hypertension]
Hydralazine (Apresoline, Apresozide)
Minoxidil (Loniten) {opens K^+ channels r hyperpolerization}
{dilates renal arterioles}

u HR
u Contractility
Reflex tachycardia r u angina
Orthostatic & post exercise hypotension

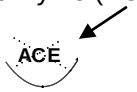
Angiotensin Converting Enzyme Inhibitors (ACE Inhibitors)
[very effective drug in extending the life of heart failure patients]

Enalapril (Vasotec)
Captopril (Capoten)
Lisinopril (Zestril)
Ramipril (Altace)
Quinapril (Accupril)
Benazepril (Lotensin)
Fosinopril (Monopril)
Moexipril (Univasc)
Trandolapril (Mavik)

inhibits conversion of Ang.I to Ang.II
{Ang. II is a potent vasoconstrictor}
SE: cough, hyperkalemia, angioedema, proteinuria, leukopenia, dysgeusia

MECHANISM

Angiotensin converting enzyme (ACE) is inhibited



Renin - Angiotensin Cascade

u Renin r Angiotensin I r u Angiotensin II r u Aldosterone r u Na^+ retention r u H_2O retention r u BP

Angiotensin II antagonists

Losartin (Cozaar, Hyzaar)

SE: Hyperkalemia

Antiadrenergic - (central inhibition of adrenergic outflow resulting in peripheral vasodilation)

Reserpine (Serpasil)	□ HR
Clonidine (Catapress)	Orthostatic & post exercise hypotension
Guanethidine (Ismelin)	Depresses CNS sympathetic outflow
Methyldopa (Aldomet)	Used in treating CHF
Guanabenz (Wyntensin)	Syncope, diarrhea, & dejaculation
Guanfacine (Tenex)	
Guanadrel (Hylorel)	

Combinations of medications in one drug

Reserpine & Hydrochlorothiazide (Hydropress)
Serpasil-Apresoline-Esidrix (Ser-Ap-Es)

Antiarrhythmics

Class I Antiarrhythmic Agents

* All antiarrhythmics may cause False negative tests by depressing arrhythmias
* All antiarrhythmics may worsen the arrhythmia being treated

Lidocaine (Xylocaine, Xylocard) {used in emergencies and cardiac surgery only}	
Procainamide (Pronestyl){may cause false + GXT's}	
Phenytoin (Dilantin)	prolongation of QRS & QT intervals
Dysopyramide (Norpace)	no significant hemodynamic effects
Bretylium	d Conduction velocity, excitability, automaticity
Encainide {u incidence of sudden death}	U-Wave changes
Flecainide (Tambocor) {u incidence of sudden death}	
Mexiletine	
Propafenon (Rhythmal, Rhymol)	
Moricizine	

Quinidine (Quinidex, Quinaflute)	May cause ST and T-wave changes
	May induce dangerous SA blocks
	May u HR at rest & light exercise
	May delay the onset of ischemia
	May d Cardiac contractility (d preload and afterload)
	d BP by vasodilation (d TPR PVR)
	May cause false negative GXT's

MECHANISM
class I antiarrhythmics suppress phase 0 of the action potential by blocking the fast sodium channels and are known as membrane stabilizing agents

Class II Antiarrhythmic Agents
Beta Blockers

Class III Antiarrhythmic Agents

Amiodarone (Cordarone)	d HR at rest & during exercise
Bretylium	
Sotalol	

class III antiarrhythmics are also known as potassium channel blockers

Class IV Antiarrhythmic Agents
Calcium Channel Blockers

Digitalis - cardiac glycoside

[CHF, Atrial Arrhythmias - PAT, Atr. Flutter, Atr. Fib.]	NC in HR or BP at rest or exercise in normal heart
Digitoxin (Crystodigin)	d HR & u EXAT in Atrial Fibrillation & CHF
Digoxin (Lanoxin)	u Contractility
	u Q
	d conduction velocity through AV-node

MECHANISMS
Since Ca^{++} is passively linked to the Na^{+} extrusion that is performed by the Na^{+} - K^{+} ATPase pump, inhibition of Na^{+} - K^{+} ATPase pumps d Ca^{++} extrusion from the cell r u contractility. Digitalis also d conduction velocity through AV-node causing a d ventricular response to atrial fibrillation or atrial tachycardia.

Bronchodilators

Methylxanthines Bronchodilator Agents

[Asthma, Bronchitis, Emphysema]

Theophylline (Theo-Dur)	u HR-possible tachycardia d BP (hypotension)
Aminophylline	PVC's and Possible Ventricular Arrhythmias
	u Respiratory Rate
	Nausea
	Nervousness (tremors)
	Muscle twitching or convulsions

Xanthine derivatives relax the VSM of bronchial airways and pulmonary blood vessels by inhibiting phosphodiesterase (PDE) III an and PDE IV

Leukotriene Inhibitor

Montelukast Sodium (Singulair)

Sympathomimetic Bronchodilator Agents

Albuterol (Proventil, Ventolin) - β_2 agonist	u HR u BP
Isoproterenol (Isuprel)	Ectopics
Metaproterenol (Alupent)	Stimulate the β-adrenergic system
Isoetharine (Bronkosol)	
Terbutaline (Brethene)	

Antilipemics

Nicotinic Acid or Niacin (Nicobid Nicolar)

DBP, headaches, flushing, hepatic dysfunction
u HDL Cholesterol

MECHANISM

Inhibits lipoprotein secretion from liver, possibly by □ the mobilization of FFA from adipose tissue which □ the substrate available for lipoprotein synthesis

Bile Acid Binding Resins

Cholestyramine (Questran)
Colestipol (Colestid)

Possible constipation & stomach upset
May bind with & eliminate other meds. (digoxin)
d Total Cholesterol and LDL by 15% - 30%

MECHANISM

Binds the Chol. rich bile acids and causes u loss of that bile through the GI tract

HMG-Co A Reductase Inhibitors

Lovastatin (Meavacor)
Simvastatin (Zocor)
Pravastatin
Mevastatin
Atorvastatin (Lipitor)

Myalgia (muscle pain) Potential Liver Problems
d Total Cholesterol and LDL by 24% - 45%

MECHANISM

Inhibits HMG-Co-A, the rate limiting enzyme in chol. synthesis

Dextrothyroxine (Choloxin)

u HR u BP, Arrhythmias, Angina

Clofibrate (Atromid-S)

Arrhythmias, angina (prior infarction patients)

MECHANISM

Activates plasma lipoprotein lipase which d VLDL (LDL precursor) secondarily d cholesterol

Gemfibrozil (Lopid)

d triglycerides 35% d LDL 5% - 15%
Gallstone problems & Myositis

MECHANISM

Activates plasma lipoprotein lipase which d VLDL (LDL precursor) secondarily d cholesterol

Probucol (Lorelco)

Prolonged QT interval

MECHANISM

Combines with LDL in plasma & u elimination efficiency of that lipoprotein

Tranquilizers

Diazepam (Vallium & other minor tranquilizers)	No sig. effects (d HP d BP by d anxiety)
Lithium	T-Wave changes
Phenothiazines	u HR u BP False + & - PR QRS & QT prolongation

Antidepressants (Trycyclic & Monoamine Oxidase Inhibitors)

Amitryptyline (Elavil)	u HR d BP
Imipramene (Tofranil)	Arrhythmias
Trazodone (Desyrel)	PR QRS & QT prolongation False +'s Postural hypotension

Miscellaneous

Cold medications - decongestants	May include sympathominitics - IHR, IBP
Thyroid medications -(levothyroxine)	u HR u BP arrhythmias ischemia
Alcohol	u HR u BP arrhythmias
Nicotine	u HR u BP PVC's ischemia vasoconstriction tachycardia

Non-Steroidal Anti-Inflammatory Agents

Indomethacin (Indocin)	Inhibit platelet aggregation
Diclofinac Sodium (Voltaren)	May cause GI upset, ulceration, and bleeding
Piroxicam (Feldene)	
Ibuprofin (Motrin, Nupren, Advil, Rufen, Medipren, Midol)	

May cause fluid retention & peripheral edema (use with caution in CHF hypertension, etc.)

Drugs That Have No ECG Effects

Anticoagulants (Heparin, Warafin, Coumadin)
[used to prevent thromboembolic events in people with atrial fibrillation and other predisposing conditions]

Blood thinners
[used to treat claudication that accompanies PVD] {Lowers blood viscosity - u O_2 supply}
Pentoxifylline (Trental)

Antiplatelet

Dypyridamole (Persantine)	{few HR, BP, or EKG effects} may cause vasodilation

Antihistamines

Insulin

Hypoglycemic Drugs (Diabinese, Orinase, Dymelor, Tolinase, Glyburide, Micronase, Glipizide)
Associated with u cardiac mortality

Cromolyn Sodium	Bronchodilator
Corticosteroids	Moderate to high doses r u BP May be used for bronchodilation
Acetaminophen (Tylenol)	Overdosage may cause hepatic dysfunction
Acetylsalicylic Acid (Aspirin)	Possible slight u in SBP, DBP, BUN, uric acid GI irritation May be used for antiplatelet effects (MI prophylaxis)

Emergency Drugs

Sympathomimetic Agents

[Emerg. Drugs used to u Q]	u HR u BP Nervousness (tremors)
Epinephrine (Adrenalin)	May cause ectopics and palpitations (tachycardia)
Norepinephrine Drip	u Q & Contractility
Isoproterenol (Isuprel)	
Dopamine (Intropin) [u BP, u Q]	
Dobutamine (Dobutrex) [u BP, u Q]	
Amrinone	

Drugs used to Increase HR

Atropine	{enhances sinus node automaticity}	[symptomatic bradycardia]
Isoproterenol (Isuprel)	{□-adrenergic agent that u Q & causes vasodilation}	

Isoproterenol is used when atropine is not effective - more modern drugs preferred

Drugs used to Decrease BP

Sodium Nitroprusside (Nitropress)	{vasodilators affecting both arterial and venous smooth muscle}
Diazoxide (Hyperstat)	

Drugs used to reduce Pulmonary Congestion Associated with Left Ventricular Dysfunction

Furosimide (Lasix) {Rapidly acting diuretic}

Drugs used to combat Severe Congestive Heart Failure

[given when severe CHF is refractory to diuretics, vasodilators & other inotropic agents]
Amrinone {rapid acting inotropic agent}

Drugs used to Correct Ventricular Arrhythmias

[Emergency control of V-fib., V-tach., or hemodynamically significant supraventricular arrhythmias]
Lidocaine
Bretylium
Procainamide
Beta Blockers

Drugs used to relieve Pain
Morphine Sulfate {u venous capacitance & d TPR}
[given for pain & pulmonary edema associated with cardiogenic shock]

Drugs used to Correct Supraventricular Arrhythmias
Verapamil (Supraventricular tachycardia)

IV'S
D_5W
.9% Saline

Drugs used to Raise BP and □Q
Epinephrine {u HR, TPR, arterial BP, coronary blood flow, contractility, Myocardial VO_2, & automaticity}
[given during CPR]

Norepinephrine [hemodynamically significant hypotension]
Dopamine [hemodynamically significant hypotension in the absence of hypovolemia]
Dobutamine [pulmonary congestion, low Q, hemodynamically significant RV infarction]

Drugs used to Induce Coronary Artery Vasodilation
Nitroglycerine

Drugs used to Correct Hypoxemia
Oxygen

Drugs used to Correct Metabolic Acidosis
Sodium Bicarbonate

APPENDIX F

EXERCISE TESTING FORMS

Example of a Health and Lifestyle History Form

Informed Consent

Screening, Data, and Reporting Worksheets

Use of Perceived Exertion Scales

Testing Protocols

Example of FITSOFT Questionnaire

APPLIED EXERCISE SCIENCE LABORATORY
DEPARTMENT OF HEALTH AND KINESIOLOGY
TEXAS A&M UNIVERSITY, COLLEGE STATION, TEXAS 77843

HEALTH AND LIFE STYLE HISTORY

Please complete this form as accurately and completely as possible. The information you provide will be used to evaluate your health by the physician or exercise physiologist who will see you in our laboratory. All information will be treated as privileged and confidential.

IDENTIFICATION AND GENERAL INFORMATION

1. Name _____ 2. Soc. Sec.#_____ 3. Today's Date ___ _____
Last First M.I. mo/da/yr

4. Age _____ yrs 5. Date of Birth _____ 6. Sex _____Male _____Female

7. Home Address _____
Street City State Zip

8. Office Address or Department _____

9. Home Phone #_____ 10. Office Phone #_____ 11. Occupation

12. Personal Physician_____
Name Street City State Zip

ILLNESSES AND MEDICAL PROBLEMS Check all the conditions or diseases for which you have been diagnosed and/or treated. Also give the date of occurrence or diagnosis. If you suspect that you may suffer from one of the conditions, please indicate this in the right margin after the date.

Condition Diagnosed	Yes Date (mo/yr)
13. AIDS	_____
14. Alcoholism	_____
15. Anemia	_____
16. Arthritis	_____
17. Asthma	_____
18. Bronchitis (chronic)	_____
19. Cancer:	
20. Breast	_____
21. Cervix	_____
22. Colon	_____
23. Lung	_____
24. Uterus	_____
25. Other_____	_____
26. Cirrhosis (liver)	_____
27. Colitis (ulcerative)	_____
28. Depression	_____
29. Diabetes	_____
30. Emphysema	_____
31. Epilepsy	_____
32. Frequent Bleeding	_____

33. Hepatitis B
34. Pneumonia
35. Tuberculosis
36. Renal/Kidney Problems
37. Other_____

Cardiovascular Problems Diagnosed

	Yes	Date (mo/yr)
38. Stroke		
39. Heart Attack		
40. Coronary Disease		
41. Rheumatic Fever		
42. Rheumatic Heart Disease		
43. Heart Valve Problem		
44. Heart Murmur		
45. Enlarged Heart		
46. Heart Rhythm Problem		
47. Other Heart Problems		
48. High Blood Pressure (controlled)		
49. High Blood Pressure (uncontrolled)		
50. High Blood Cholesterol		
51. Diseases of the Arteries		
52. Phlebitis		
53. Systemic or Pulmonary Embolus		
54. Other		
55. Other		

Do You Now Have or Have You Recently Had:

	Yes	Most Recent Occurrence (mo/yr)
56. Seizures		
57. Chest pain on exertion relieved by rest		
58. Chest pain not always associated with exertion?		
59. Shortness of breath lying down, relieved by sitting up?		
60. Unexpected weight loss (more than 10 lbs)?		
61. Unexpected rectal bleeding		
62. Leg Pain after walking short distances?		

Women Only (Men May Skip to Number 68)
Please Answer the Following:

	Yes	Date (mo/yr)
63. Was your last pelvic exam or Pap smear abnormal?		
64. Do you have menstrual period problems?		
65. List number of menstrual periods in last year _____		
66. When was your last menstrual period? (1st day)	month_____day_____ yr	
67. Please give number of:	pregnancies_____ living children	

Men And Women Answer the Following:

Have you ever had:	Yes	Date (mo/yr)
68. A chest x-ray?		
69. An abnormal chest x-ray?		
70. An ECG (electrocardiogram)?		
71. An abnormal ECG?		
72. An exercise stress test?		
73. An abnormal exercise stress test?		

MEDICATIONS Check those medications which you are currently taking on a regular basis. If your medication is not listed, please list it in blanks marked "other".

74. ___None
75. ___Aldomet
76. ___Allergy Medication
77. ___Aminophylline
78. ___Antacids
79. ___Aspirin
80. ___Asthma Inhaler
81. ___Birth control pills
82. ___Blocardren (Timolol)
83. ___Bumex
84. ___Butazolidin
85. ___Catapres
86. ___Cardizem (Diltiazem)
87. ___Corgard (Nadolol)
88. ___Coumadin
89. ___Crystodigin
90. ___Diabinese
91. ___Digitalis
92. ___Digitoxin
93. ___Digoxin (Lanoxin)
94. ___Dilantin
95. ___Dyazide
96. ___Dymelor
97. ___Feldane
98. ___Hydrodiuril
99. ___Hydropres
100. ___Hygroton
101. ___Inderal (Propranolol)
102. ___Insulin
103. ___Iron
104. ___Isoptin (Verapamil)
105. ___Isordil
106. ___Lanoxin
107. ___Lasix
108. ___Librium
109. ___Lopressor
110. ___Maxizide
111. ___Minipress
112. ___Motrin
113. ___Muscle Relaxant
114. ___Naprosyn
115. ___Nitro-bid
116. ___Nitroglycerin
117. ___Norpace
118. ___Norvasc
119. ___Oral hypoglycemic agents
120. ___Orinase
121. ___Penicillin
122. ___Persantine
123. ___Potassium
124. ___Pravachol
125. ___Prednisone
126. ___Pro-banthine
127. ___Procardia (Nifedipine)
128. ___Procan SR
129. ___Pronestyl
130. ___Quinaglut
131. ___Quinidine
132. ___Reglan
133. ___Reserpine
134. ___Ser-Ap-Es
135. ___Sleeping pills
136. ___Tagamet
137. ___Tenormin (Atenolol)
138. ___Thiazides
139. ___Thyroid
140. ___Trandate (Labetalol)
141. ___Valium
142. ___Visken (Pindolol)
143. ___Vitamins
144. ___Zantac
145. ___Zyloprim
146. ___Others_____
147. ___Others_____
148. ___Others_____
149. ___Others_____
150. ___Others_____
151. ___Others_____

SURGICAL HISTORY Check the surgical procedures you have had and give the date of the surgery.

	Yes	Date (mo/yr)
152. Appendectomy		
153. Knee Surgery or ankle surgery		
154. Arm or shoulder surgery		
155. Back surgery		
156. Hysterectomy (women only)		
157. Vasectomy (men only)		
Cancer related surgery		
158. Breast		
159. Cervix		
160. Colon		
161. Lung		
162. Uterus		
163. Liver		
164. Kidney		
165. Other (Specify)_____		

	Yes	Date (mo/yr)
Heart surgery		
166. Heart catheterization		
167. Angioplasty (PTCA)		
168. Coronary bypass (CABG)		
169. Valve repair/replacement		
170. Other		

ORTHOPEDIC PROBLEMS Place a check in the blank to indicate any of the following orthopedic problems you may have.

		Yes	Most Recent Occurrence (mo/yr)
171.	Low back pain		
172.	Shoulder pain		
173.	Elbow pain		
174.	Wrist or hand pain		
175.	Hip problems		
176.	Knee problems		
177.	Ankle or foot problems		
178.	Work or exercise limited by orthopedic problem?		
179.	Other _____		

FAMILY HISTORY Please identify blood relatives who have been diagnosed as having the following diseases and give their age at time of diagnosis.

	Yes	Age at Diagnosis
Heart Disease		
180. Father		
181. Mother		
182. Sibling		
183. Paternal grandparent		
184. Maternal grandparent		
High Blood Pressure		
185. Father		
186. Mother		
187. Sibling		
188. Paternal grandparent		
189. Maternal grandparent		
Stroke		
190. Father		
191. Mother		
192. Sibling		
193. Paternal grandparent		
194. Maternal grandparent		

Have any of your blood relatives noted above had any of the following?

	Yes	Age Diagnosed
195. Heart attack under age 50		
196. Heart operations		
197. Stroke under age 50		
198. Elevated cholesterol		
199. Hypertension under age 40		
200. Diabetes		
201. Obesity		
202. Cancer under age 60		

HISTORY OF TOBACCO USE

	Yes	No
203. Have you ever used tobacco products including smokeless?	_____	_____
204. Do you presently use tobacco products?	_____	_____

If you did or do use tobacco, please indicate the average amount used per day and the age you started.

	Amount	Age Started
205. Cigarettes (number cig. per day)	_____	_____
206. Cigars (number per day)	_____	_____
207. Pipe (number pipefuls per day)	_____	_____
208. Smokeless (fraction of packs/tins/day)	_____	_____

209. If you have quit using tobacco, when was it? (mo/yr) _____
210. How old were you when you quit using tobacco? _____

SMOKING/STRESS/TENSION

Smoking - My smoking history is:
Never____[0] Not for last 10 years____[2] Not for last 5 years____[3]
Recently quit____[4] Still smoke____[5]

Stress / Tension

Rate how closely you agree with each of the following statements by filling in the blank preceding each statement with a number from 1 to 10.

Strongly Disagree				Agree Somewhat					Strongly Agree
1	2	3	4	5	6	7	8	9	10

_____1. I can't honestly say what I really think or get things off my chest at work, school, or home.
_____2. I seem to have lots of responsibilities but little authority.
_____3. I seldom receive adequate acknowledgment or appreciation when I do a good job.
_____4. I have the impression that I am repeatedly picked on or discriminated against.
_____5. I feel I am unable to use my talents effectively or to their full potential.
_____6. I tend to argue frequently with co-workers, customers, teachers, or other people.
_____7. I don't have enough time for family and social obligation or personal needs.
_____8. Most of the time I have little control over my life at work, school or home.
_____9. I rarely have enough time to do a good job or accomplish what I want to.
_____10. In general, I'm not particularly proud of or satisfied with what I do.

ALCOHOL CONSUMPTION

211. Do you drink alcoholic beverages? __Yes __No

If **YES,** please indicate the type and amount you consume per week.

	Amount
212. Glasses of beer per week (12 oz.)	_____
213. Glasses of wine per week (8 oz.)	_____
214. Ounces of liquor (cordials=1 oz)	_____
215. Ounces of hard liquor (shot=1 oz)	_____

SPORT ACTIVITIES Check those activities in which you regularly participate or in which you have participated over the past year. Also indicate the approximate number of months in the last year you engaged in these activities, the number of times per month, the number of minutes per session, and the intensity of your participation. **Note:** Rate your intensity on a scale of **1** to **10** with **1** being very low and **10** being very high intensity.

	# of months per year	# times per month	Min/session	Intensity (1=low;10=high)
216. Basketball	_____	_____	_____	_____
217. Volleyball	_____	_____	_____	_____
218. Softball	_____	_____	_____	_____
219. Baseball	_____	_____	_____	_____
220. Jogging	_____	_____	_____	_____
221. Running	_____	_____	_____	_____
222. Swimming	_____	_____	_____	_____
223. Bicycling	_____	_____	_____	_____
224. Golf	_____	_____	_____	_____
225. Tennis	_____	_____	_____	_____
226. Badminton	_____	_____	_____	_____
227. Racquetball	_____	_____	_____	_____
228. Handball	_____	_____	_____	_____
229. Table Tennis	_____	_____	_____	_____
230. Sailing	_____	_____	_____	_____
231. Water Skiing	_____	_____	_____	_____
232. Horseback Riding	_____	_____	_____	_____
233. Bowling	_____	_____	_____	_____
234. Calisthenics	_____	_____	_____	_____
235. Walking	_____	_____	_____	_____
236. Canoeing/Rowing	_____	_____	_____	_____
237. Fishing	_____	_____	_____	_____
238. Hunting	_____	_____	_____	_____
239. Dancing	_____	_____	_____	_____
240. Skating	_____	_____	_____	_____
241. Soccer	_____	_____	_____	_____
242. Lawnwork/Yard Care	_____	_____	_____	_____
243. Gardening	_____	_____	_____	_____
244. Housework	_____	_____	_____	_____
Other_____	_____	_____	_____	_____
Other_____	_____	_____	_____	_____
Other_____	_____	_____	_____	_____

In addition to the above information that you have listed, are you aware of any other conditions, symptoms, or special circumstances that might be related to our overall health and well being? _____If so, please give a detailed explanation below.

_____
_____
_____
_____
_____

Applied Exercise Science Laboratory
Department of Health & Kinesiology
Texas A&M University

Informed Consent for Cardiovascular Evaluation and Testing

I give my permission to undergo the following test procedures. My permission to perform these procedures is given voluntarily and I am free to deny consent if I so desire. I will undergo a venous blood draw from the arm. I will perform maximal strength and muscular endurance tests consisting of the maximum number of pushups and sit-ups I can do in one minute and a maximum handgrip test. I will perform a test of dynamic lung function consisting of maximal inhalations and exhalations. I will undergo an underwater weighing procedure for the assessment of body composition. I will perform a maximum exertion graded exercise test on a bicycle ergometer or a motor-driven treadmill. The exercise intensity of the graded exercise test will begin at a level and will be advanced in stage increments until I terminate the test due to volitional fatigue or the test is terminated by the technician, physician, or laboratory supervisor. The testing personnel may stop any of the tests at any time, or I may stop them when I wish because of personal feelings of fatigue or discomfort. I need not exercise at a level which is extremely uncomfortable for me; however, I recognize that for maximum test accuracy, I need to exercise as long or as intense as is comfortable. I understand that I am in no way obligated to undergo any test procedure that I feel may be hazardous to my health. All of the tests that I choose to undergo, I do so of my own volition, having been informed of the associated risks. If I have any doubts or questions concerning any of the procedures, I will ask for further explanations.

I understand that there exists the possibility of detrimental physiological changes occurring during the above mentioned tests. They include muscle pulls and strains, residual muscle soreness, possible aspiration of water (underwater weighing), abnormal blood pressure, fainting, disorders of heart beat, and in rare instances, heart attack and/or sudden death. (Every effort will be made to minimize these occurrences through the preliminary examination and by observation during testing. Emergency equipment and trained personnel are available to deal with unusual situations which may arise. Also, Para-Medical Emergency service is within three miles of the Applied Exercise Science Laboratory and the Student Health Service with physicians is within about 500 yards.)

I understand that the results obtained from the graded exercise test may assist in detecting an illness or in evaluating what types of physical activities I might engage with no or low hazards. I also understand however, that these tests are not 100% sensitive or specific in detecting heart disease. In other words, it is possible to have heart disease and it not be detected by the test.

I realize that the information which is obtained will be treated as privileged and confidential and will not be released or revealed to any person without an expressed written consent from me. The information obtained, however, may be used for statistical analysis or scientific purposes with my right of privacy retained.

I also hereby agree to hold harmless Texas A&M University and all persons associated with the tests mentioned above from any damages or injuries that may result from my undergoing these tests, regardless of whether negligence on the part of persons associated with the tests is involved.

I have read this form and I understand the test procedures that I will perform. All my questions concerning the testing procedures have been answered to satisfaction. By signing this document, I am giving my consent to participate in these procedures.

Signature of Participant	Print Name of Participant	Signature of Witness	Date

Applied Exercise Science Laboratory
Pre-Exercise Screening Data

Demographics

Name: _____ SS#: _____ Date: _____ Group: _____

Heart Disease Risk, Status, & Symptoms

Heart Disease Risk Factors & Medical History	Status & Symptoms
____ Hypertension	____ No known CAD
____ Total Cholesterol _____ mg/dl	____ Chest Pain
____ Smoking	Dyspnea
____ Family History	Arrhythmias
____ Abnormal Resting ECG	Syncope
____ Diabetes	Post M.I.
____ Sedentary Lifestyle	Date(s)_____ Comments
____ Obesity	Heart Surgery
____ Stress	Date(s) _____ Type _____
____ Age over 50	Other Pertinent Surgery
____ Other Pertinent Medical History_____	Date(s) _____ Type_____
_____	Other Pertinent Symptoms _____

Physical Examination

Cardiovascular

Peripheral Pulses _____ Cardiac Auscultation Results: ___Normal ____Abnormal Murmurs

Edema_____ Other_____

Xanthoma _____ _____

Comments _____

Pulmonary

_____ Clubbing _____ Cough _____ Chest Abnormalities _____ Wheezes / Rales

Auscultation Results: _____Normal _____Abnormal

Orthopedic Problems or Acute Illnesses Limiting Exercise

Explain:

_____

Authorization for Exercise Testing

I have examined the above individual and approve his/her participation in a physical fitness evaluation and a symptom limited maximal graded exercise test conducted within the Applied Exercise Science Laboratory, Texas A&M University.

Physician's Signature: _____ Date: _____

Graded Exercise Test Report

Resting Data

Supine	HR: _____ BP: _____ ECG: _____ normal _____ abnormal° _____ equivocal° ___inconclusive°
Other	HR: _____ BP: _____ ECG: _____ normal _____ abnormal° _____ equivocal° ___inconclusive°

Graded Exercise Data

Exercise	HR responses: _____ normal _____ abnormal° _____ symptoms° _____ inconclusive° BP responses: _____ normal _____ abnormal° _____ equivocal° _____ inconclusive° ECG: _____ normal _____ abnormal° _____ equivocal° _____ inconclusive°
Recovery	HR responses: _____ normal _____ abnormal° _____ symptoms° _____ inconclusive° BP responses: _____ normal _____ abnormal° _____ equivocal° _____ inconclusive° ECG: _____ normal _____ abnormal° _____ equivocal° _____ inconclusive°

Interpretation / Comments:

Recommendation:

Based on the examination of this individual's health history, cardiovascular disease risk, and the physiologic, hemodynamic, and electrocardiographic responses to incremental exercise, it is concluded that:

___ It is SAFE for this individual to participate in exercise as prescribed by the Applied Exercise Science Laboratory.

___ It MAY NOT BE SAFE for this individual to exercise - they should consult their physician for further evaluation.

Lab Supervisor or Physician: _____ Date:_____

Key for Interpreting Resting Data and Graded Exercise Test Data (ν)ECG

Abnormal

1. ST8 or 9 ∃1 mm
2. Induced BB Block
3. Post-ex. U inv.
4. Angina
5. V-Tach.
6. Sust. Supra V-Tach.
7. R on T PVC
8. Frequent PVC's
9. Multifocal PVC's
10. 2nd or 3rd deg. HB
11. Other:

Equivocal

12. Occasional PVC's
13. First deg. HB
14. Aberrant A-V conduction
15. Upsloping ST depression
16. Junctional or atrial arrhythmias
17. Other: _____

Inconclusive

18. Submax. Effort
19. Drug effect
20. Equipment failure
21. Other_____
_____

Hemodynamic Responses

22. Hypotension
23. Bradycardia
24. Marked Hypertension
25. Failure of SBP to rise
26. Other:

Symptoms

27. Severe chest pain
28. Dyspnea
29. Pallor
30. Cyanosis
31. Lightheadedness
32. Fainting
33. Other:

Applied Exercise Science Laboratory
Graded Exercise Testing Worksheet

Pre-exercise Data

Name: _____ Date of Test_____ Test Protocol:_____
Pertinent Medical History: _____
Pertinent Medications / Doses: _____
Supine HR _____ Supine BP _____
Pre-ex HR _____ Pre-ex BP _____ Predicted max HR _____ 85% Predicted max HR_____

Exercise Data

Time	Speed RPM	Grade KGM	HR	BP	RPE	Comments

Recovery Data

Time	HR	BP	Comments

Maximal Exercise Data

Max. Ex. Time _____ Peak HR _____ Peak BP
Reason for Stopping _____ν

ν
1 ST ∞ or ∑ ∃ 2 mm
2 Chest Pain
3 Induced BB Block
4 Abnormal BP Response
5 V-Tach
6 Sust. A-Tach.
7 2nd or 3rd degree HB
8 Frequent PVC's
9 R on T PVC
10 Multifocal PVC's
11 Light Headedness
12 Dyspnea
13 Claudication
14 General Fatigue
15 Other_____

ECG Technician :_____ BP Technician : _____

Body Composition and Fitness Testing Worksheet

Demographics

Name: _____ Date:
(Last) (First) (M.I.)

Age: _____

Sex (M/F): _____ SS#: _____

Height (inches): _____ Group: _____

Weight (pounds): _____ Height & Weight Technician: _____

Body Composition

Hydrostatics Technician:_____

Water Temp. (deg. Celsius): _____

Tare Weight (kg): _____

UW Weight trials (kg): _____ _____ _____

. _____ _____ _____ _____

Circle highest 3 within 0.15 kg

Circumferences Technician:_____

Waist_____ Hip_____

Skinfolds Technician:_____

Chest	1____	2___	mean__
Axilla	1____	2___	mean__
Triceps	1____	2___	mean__
Subscapular	1____	2___	mean__
Abdominal	1____	2___	mean__
Suprailiac	1____	2___	mean__
Thigh	1____	2___	mean__

Muscular Strength, Muscular Endurance, and Flexibility

Handgrip (circle best): _____ _____ _____ _____ _____ Technician:_____

Sit-Ups in 1 minute: _____ Push-Ups in 1 minute: _____ Sit-and-Reach (circle best): ___ ___ ___ ___

Perceived Exertion Scale (RPE)

The Rated Perceived Exertion chart is a means by which a subject can communicate how hard they feel the work is which they are performing. Perceived exertion means the total amount of exertion and physical fatigue a person feels. Below is the BORG perceived exertion scale….note that adding a "0" after the RPE number gives a crude estimation of heart rate.

RPE Chart

6 Standing on unmoving treadmill
7 VERY VERY LIGHT
8
9 VERY LIGHT
10
11 FAIRLY LIGHT
12
13 SOMEWHAT HARD
14
15 HARD
16
17 VERY HARD
18
19 VERY VERY HARD
20 = at MAX on treadmill

Perceived Exertion Explanation to Relay to Client

You are now going to take part in a graded exercise test. You will be walking or running on the treadmill while we are measuring various physiological functions. We also want you to try to estimate how hard you **feel** the work is; that is, we want you to rate the degree of perceived exertion you feel. By perceived exertion, we mean the total amount of exertion and physical fatigue. Don't concern yourself with any one factor such as leg pain, shortness of breath, or work grade, but try to concentrate on you **total**, inner feeling of exertion. Try to estimate as honestly and objectively as possible. Don't underestimate the degree of exertion you feel, but don't overestimate it either. Just try to estimate as accurately as possible.

Exercise Testing Protocols

Bruce Protocol – 3 minute stages

1	1.7 mph	45.6 m/min	10.0% grade
2	2.5	67.0	12.0
3	3.4	91.1	14.0
4	4.2	112.6	16.0
5	5.0	134.0	18.0
6	5.5	147.4	20.0

Naughton Protocol – 2 minute stages

1	2.0 mph	53.6 m/min	0.0% grade
2	2.0	53.6	3.5
3	2.0	53.6	7.0
4	2.0	53.6	10.5
5	2.0	53.6	14.0
6	2.0	53.6	17.5
7	3.0	80.4	12.5
8	3.0	80.4	15.0
9	3.0	80.4	17.5
10	3.0	80.4	20.0

Balke Protocol- 1 minute stages

1.	3.3mph	88.4 m/min	1 % grade
2.	3.3mph	88.4 m/min	2
3.	3.3mph	88.4 m/min	3
4.	3.3mph	88.4 m/min	4
5.	3.3mph	88.4 m/min	5
6.	3.3mph	88.4 m/min	6
7.	3.3mph	88.4 m/min	7
8.	3.3mph	88.4 m/min	8
9.	3.3mph	88.4 m/min	9
10.	3.3mph	88.4 m/min	10
.	.	.	.
.	.	.	.
.	.	.	.
.	.	.	.

Testing Protocols and Their Oxygen Uptake Stage Equivalents

Maximum Oxygen Uptake		Mode of Estimating Maximum Oxygen Uptake			
ML/KG•MIN	METS*	Balke**	Bruce**	Astrand**	1.5 Mile Run**
17.5	5.0	4:00	3:30	(mph)	(min:sec)
21.0	6.0	6:00	4:30		
24.5	7.0	8:00	6:00		
27.0	7.7	9:30	7:00	5.00	19.00
29.0	8.3	10:00	7:30	5.00	18:30
31.5	9.0	12:00	8:00	5.25	16:30
35.0	10.0	14:30	9:00	5.50	15:00
37.0	10.6	16:00	9:30	5.50	13:30
39.0	11.1	17:00	10:00	5.75	13:00
41.0	11.7	18:00	10:30	6.00	12:30
42.5	12.1	19:00	11:00	6.25	12:00
45.0	12.9	21:00	11:30	6.50	11:00
46.5	13.1	22:00	12:00	6.75	10:45
48.0	13.7	23:00	12:30	7.00	10:30
49.5	13.9	24:00	13:00	7.00	10:00
51.5	14.4	25:00	13:30	7.25	9:45
53.0	15.1	26:30	14:00	7.50	9:30
55.0	15.7	27:15	14:30	7.75	9:15
56.5	16.1	28:00	15:00	8.00	9:00
58.0	16.6	28:30	15:30	8.25	8:30
60.0	17.1	29:00	16:00	8.50	8:15
63.5	18.1	30:00	17:00	9.00	7:45
66.0	18.9	31:00	17:30	9.25	7:15
68.0	19.4	32:00	18:00	9.50	7:00
71.5	20.4	33:00	18:30	10.00	6:45
74.0	21.1	34:00	19:00	10.50	6:30
77.5	22.1	36:00	21:00	11.00	6:10

*****MET refers to metabolic equivalent above the resting metabolic level. Value at rest is approximatley 3.5 milliliters per kilogram of body weight per minute oxygen consumed. ******Data expressed in minutes and seconds of test protocol (duration) completed.

Texas A&M University
Health and Lifestyle Profile Questionnaire

Participant Information

Name _____ **Social Security Number** _____

Address _____

City _____ **State** _____ **Zip Code** _____

Home Telephone _____ Work Telephone _____

Date of Birth _____ **Age** _____ **Gender** ❑ Male ❑ Female

Primary Physician _____ Phone Number _____

Biometrics

Body Frame Size: ❑ Small ❑ Medium ❑ Large

What is your percent body fat? (leave blank if you don't know) _____%

If you do not know the percentage, check the box that describes your body fat %.

❑ High ❑ Normal or Low ❑ Don' t Know

What is your blood pressure (mm Hg)? _____/_____

If you do not know the numbers, check the box that describes your blood pressure.

❑ High ❑ Normal or Low ❑ Don' t Know

What is your blood cholesterol (mg/dl)? _____

If you do not know the number, check the box that describes your blood cholesterol.

❑ High ❑ Normal or Low ❑ Don' t Know

What is your LDL (mg/dl)? _____

What is your triglycerides level (mg/dl)? _____

What is your blood glucose level (mg/dl)? _____

Tobacco

Cigarette Smoking

How would you describe your cigarette smoking habits?

- ❑ Never Smoked (go to next section)
- ❑ Used to Smoke (go to B)
- ❑ Still Smoke (go to A)

A. Still Smoke

How many cigarettes a day do you smoke? _____

B. Used to Smoke

How many years has it been since you smoked cigarettes fairly regularly? _____

What was the average number of cigarettes per day that you smoked in the 2 years before you quit?

Cigars and pipes

How many cigars do you currently smoke per day? _____
How many pipes of tobacco do you currently smoke per day? _____
How may times per day do you currently use smokeless tobacco? _____

Safety

In the next 12 months how many thousands of miles will you travel by each of the following?

_____,000 car, truck, van:
_____,000 Motorcycle:

On a typical day how do you usually travel?

- ❑ Walk
- ❑ Bicycle
- ❑ Motorcycle
- ❑ Sub-compact or compact car
- ❑ Mid-size or full-size car
- ❑ Truck or van
- ❑ Bus, subway, or train
- ❑ Mostly stay at home

What percent of the time do you usually buckle your safety belt when driving or riding? _____
On average, how close to the speed limit do you usually drive?

- ❑ within 5 mph of limit
- ❑ 6-10 mph over limit
- ❑ 11-15 mph over limit
- ❑ More than 15 mph over limit

How many times in the last moth did you drive or ride when the driver had perhaps too much alcohol to drink?

_____

Do you have working smoke detectors in your home?

❑ yes ❑ no

Do you have a working fire extinguisher in your home?

❑ Yes ❑ No

Does every bathtub and bathroom flor in your home have a nonskid surface or rubber mat?

❑ Yes ❑ No

When you life a heavy object do you bend your knees and keep your back straight?

❑ Yes ❑ No

Nutrition

How many drinks of alcoholic beverages do you have in a typical week?

____ Beer
____ Wine
____ Wine Coolers
____ Liquor

How many DAILY servings of the following do you usually eat?

Number of Servings	Food	Serving Size
	Breads, cereal, rice and pasta	**½ cup**
	Vegetables	**½ cup**
	Fruit	**½ cup**
	Milk, yogurt, and cheese	**1 cup**
	Meat, poultry, dry beans, eggs and nuts	**Size of a deck of cards**

How often do you eat foods high in fat such as fatty meat and fried foods?

❑ Daily

❑ 3-6 times per week

❑ 1-2 times per week

❑ A few times per month

❑ Rarely

How many 8 oz. Glasses of water do you usually drink each day (include all fluids not containing caffeine or alcohol /

Stress

i.e. juice, caffeine free tea, milk, etc.)? _____

How do you feel you are currently coping with life in general?

❑ Seldom stressed, coping very well

❑ Sometimes stressed, coping fairly well

❑ Often stressed, trouble coping at times

❑ Heavily stressed, often have trouble coping

❑ Excessively stressed, unable to cope

Have you felt tired, worn out, used up or exhausted during the past month?

❑ The majority of the time

❑ Less than half of the time

❑ Only occasionally

❑ Seldom or never

How supportive do you feel your family and close friends are?

- ❑ Very supportive
- ❑ Somewhat supportive
- ❑ Not very supportive

Check all of the following stress management techniques that you use:

- ❑ Participate in a hobby
- ❑ Belong to a social group
- ❑ Practice deep relaxation 3x/week

Exercise

How often do you do strength building exercises; such as situps, pushups or use weight training equipment?

- ❑ Seldom or never
- ❑ Once a week

How often do you do stretching exercises specifically for your lower back and thighs?

- ❑ Seldom or never
- ❑ Once a week
- ❑ Twice a week
- ❑ Three or more times per week

Which selection best describes your general ACTIVITY LEVEL for the PREVIOUS MONTH?

"Moderate Activities" include brisk walking, heavy housework, yard work, and recreational sports.

"Heavy Activities" include running, aerobic dance, heavy moving and competitive sports like basketball, soccer, etc.

Pick only one!

- ❑ Avoid all exercise and physical activity
- ❑ Some moderate activity (10 to 60 minutes per week)
- ❑ Walk for pleasure, routinely use stairs, etc.
- ❑ More moderate activity (over one hour per week)
- ❑ Some heavy activity (less than 30 min/week)
- ❑ Heavy activities totaling 30-60 min/week
- ❑ Heavy activities totaling 1-3 hours/week
- ❑ Heavy activities totaling 3+ hours/week

Women Only (men skip to Preventive Exams)

At what age did you have your first menstrual period? _____ years

How old were you when your first child was born (if no children, leave blank)? _____ years

How many women in your natural family (mother and sisters only) have had breast cancer? _____

Have you had a hysterectomy?

❑ Yes ❑ No

Preventive Exams

Preventive Exams	Never	<30 days	< 1 year	< 2 years	< 3 years	< 5 years
Physical Exam	❑	❑	❑	❑	❑	❑
Dental Exam	❑	❑	❑	❑	❑	❑
Digital Rectal Exam	❑	❑	❑	❑	❑	❑
Stool Blood Test	❑	❑	❑	❑	❑	❑
Sigmoidoscopy	❑	❑	❑	❑	❑	❑
Self Skin Exam	❑	❑	❑	❑	❑	❑
Women						
Self Breast Exam	❑	❑	❑	❑	❑	❑
Clinical Breast Exam	❑	❑	❑	❑	❑	❑
Mammography	❑	❑	❑	❑	❑	❑
Pap Smear	❑	❑	❑	❑	❑	❑
Men						
Self Testicular Exam	❑	❑	❑	❑	❑	❑
Prostate – Specific Antigen	❑	❑	❑	❑	❑	❑

Medical History

Have you ever been told that you have diabetes?

❑ Yes ❑ No

Have you ever had cancer?

❑ Yes ❑ No

Has a doctor ever told you that you have heart disease?

❑ Yes ❑ No

Do you have fair skin?

❑ Yes ❑ No

Do you use sun block?

❑ Yes ❑ No

Check below the medical conditions experienced by someone in your immediate family (parents, grandparents, brothers, or sisters).

❑ Heart attack ❑ Diabetes

❑ Stroke ❑ High blood pressure

❑ Cancer ❑ Alcoholism

Do you have any orthopedic problems that limit your ability to exercise?

❑ Yes ❑ No If yes, explain _____

How would you rate your overall health?

❑ Poor ❑ Fair ❑ Good ❑ Excellent

Additional Questions

Please list any medications you are currently taking:

_____

_____

_____

_____

____

Please list any other physical conditions or medical ailments that you may have that were not addressed in this questionnaire:

_____

_____

_____

_____

____